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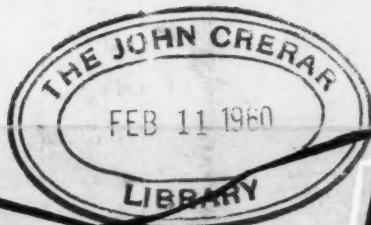
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# The Mining Journal

LONDON, JANUARY 22, 1960

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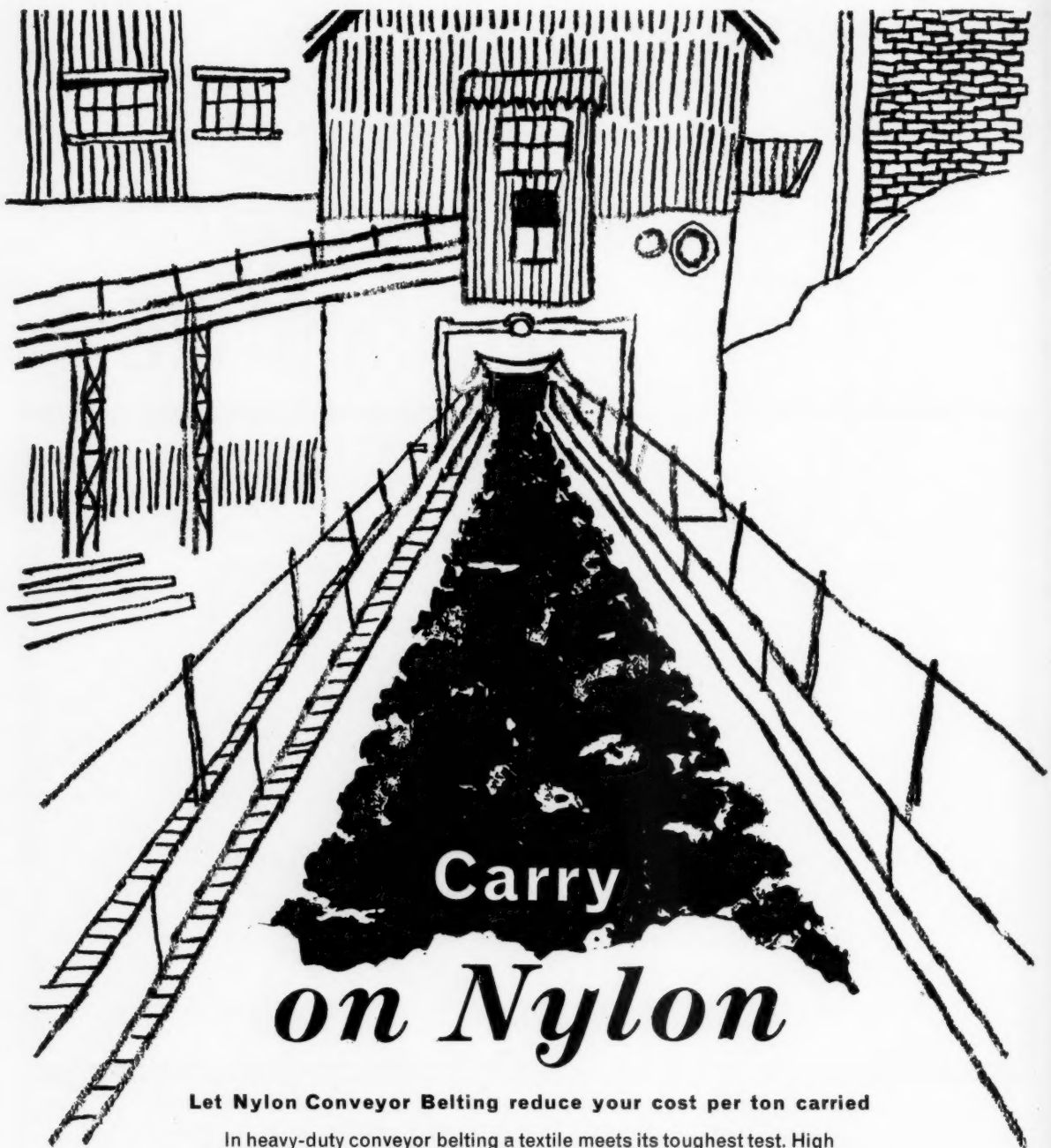


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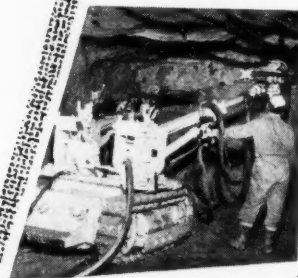
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# The Mining Journal

London, January 22, 1960

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### Editor

U. Baliol Scott

### Deputy Editor

A. Graham Thomson

### Assistant Editor

R. Bowran

### Assistant Financial Editor

R. A. Nuttall

### Display Advertisement Manager

E. S. Hooper

### Circulation

Robert Budd

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### Directors

E. Baliol Scott  
(Chairman)

G. A. Baliol Scott

U. Baliol Scott  
(Managing)

R. A. Ellefsen

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### Telegraphic

Tutwork London

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## The Sub-Economics of Future Mineral Supplies

**T**HROUGHOUT the war the metal industries were bedevilled by shortages of materials whose availability had formerly been taken for granted. These scarcity conditions, characterised by inflated prices and official restrictions, persisted in varying extent during the early post-war years and were given a renewed impetus by the Korean crisis and government stockpiling programmes. On the other hand, by stimulating exploration and the expansion of mine and smelter capacity, these same conditions were eventually responsible for an over-correction of the imbalance, resulting in a buyers' market which, for a number of minerals and metals, has not yet entirely disappeared.

These sweeping transformations from abundance to scarcity and thence to over-supply, with their dramatic effects on the metal markets, have profoundly influenced current thinking as regards both metal usage and the development of future sources of supply. After their unhappy experiences of recent years, consumers are understandably reluctant to base their production programmes on any materials for which a dependable supply at reasonably stable prices cannot be counted upon in the years ahead. So rapidly are metallurgy and chemistry advancing that designers have an ever-widening range of materials at their disposal, which includes not only new and improved alloys but also plastics and even synthetic metals.

The point has, in fact, been reached where the great majority of metals have few, if any, applications for which a practicable substitute could not be found. In quite a number of cases the substitute has actually proved more efficient or cheaper than the original material, with the result that producers of various metals that became scarce or costly have lost valuable traditional markets, perhaps for ever. Henceforward the user's choice of material is likely to be governed as much by availability as by price, so that to hold its established markets and find new fields of application, a metal must not only be competitive pricewise, but must also be backed by adequate production capacity and mineral reserves.

Hence a wide margin of reserve capacity has become desirable, not only as an insurance against future shortages in the event of a sudden upsurge in demand, but also as an essential part of sales promotion. This policy has been adopted by the nickel industry under the leadership of International Nickel, whose decision to proceed with the vast Manitoba project has proved particularly timely in view of the political uncertainties now surrounding the future of Freeport's Cuban enterprise and of the Nicaro plant. Aluminium's drive for markets is also backed by reserve capacity to provide for future needs. The knowledge that mine and smelter capacity in the copper industry is adequate to take care of all foreseeable demands must have been of inestimable value to producers during the current strike in the United States; but for this stabilizing factor prices would almost certainly have risen more steeply and consumer confidence, seriously

affected during the scarcity years, could once again have received a nasty knock.

The same considerations apply no less forcefully to the newer metals, which sooner or later must compete in the commercial market on the basis of price and availability, since it can safely be predicted that few, if any, will prove to be indispensable. Until quite recently the development of pure niobium as an engineering material was hampered by the limited availability of niobium-containing minerals, as well as by the high cost of mineral processing, and, finally, by the expense and difficulties of producing and processing metal of commercial purity. These obstacles to development have now been largely overcome. So far as supplies of minerals are concerned, Nigeria's resources of columbite are known to be very large, while the potential reserves of pyrochlores alone are estimated to contain over 4,000,000 tons of niobium metal. Moreover, progress in the extractive metallurgy of niobium, as well as in the technology of concentrating the various low-grade ores from which it is derived, is helping to make niobium a very much cheaper metal.

Beryllium is regarded as one of the most promising of the newer metals, with rapidly growing outlets in the nuclear and aircraft fields. In the United States output is rapidly being expanded, while the world's largest beryllium metal plant is under construction in the United Kingdom, and Europe's first wrought beryllium plant—also in the United Kingdom—was recently commissioned. Nevertheless the future of beryllium depends very largely on the location of sufficient reserves to assure industrialists that this metal can safely be designed into their products. Here, again, an essential requirement is the development of cheaper and more efficient methods for the flotation of the mineral from low-grade deposits.

Dr. Donald E. White, assistant chief of the Mineral Deposits branch of the U.S. Geological Survey, stated recently that of 69 metallic elements important in missile work and space exploration, 37 were already regarded as being in critical supply or approaching a shortage point. He suggested that the soaring demand for both rare and common metals by the electronic, nuclear, missile, aircraft and plastics industries could be met in part by utilising lower-grade ore and mineral deposits.

Experience with the more common metals has shown that, in practice, submarginal ores automatically replace the reserves of payable ores as the latter are extracted. Whereas 50 years ago the average grade of copper ore mined in the U.S. (always a low grade producer) was 2.5 per cent, it is now slightly under 1 per cent. Moreover, the quantity of any mineral available is vastly increased by small reductions in the grade of the leanest ore that can be mined. The world's known iron ore reserves, for example, would be more than trebled by the inclusion of the immense low-grade deposits which cannot at present be economically extracted.

Improved concentration and beneficiation techniques, together with new mining methods and increasing mechanization, are steadily pushing back the limits of payability. It might be said, in fact, that the sub-marginal deposits of today are the payable deposits of tomorrow, and as such they should certainly be included in any long-range minerals audit.

It follows that in geological surveying the objectives should be widened to cover not only those deposits which are currently economic but also the cataloguing of all mineral deposits, so that when it becomes necessary to step down the limit of payability we know what we are doing without the necessity for a panic surveying operation. In this connection systematic geochemical surveys of selected areas to determine the degree of concentration of metals likely to be in short supply might well prove rewarding at no very distant date.

## MINING DEVELOPMENTS IN CHINA

Writing in the current issue of *The Peking Review*, the well-known Chinese scientist Chu Ko-chin (more commonly known in the West as Coching Chu), Vice-President of the Chinese Academy of Sciences, reviews the programme of expeditions carried out under the auspices of that Academy since the Liberation, i.e. in the past ten years.

Most of these, he points out, have been comprehensive efforts, involving many sciences, for the purpose of drawing up long-term plans of economic development, and have been carried out in remote, sparsely-populated parts of the Republic, of which little was known under the former regime, when the idea of a large-scale scientific expedition, initiated, planned and financed by the State was quite unknown.

Among the expeditions to which special attention is devoted in this article is one made to Tibet, the first ever undertaken by China. This expedition, carried out in 1950, discovered for the first time the stratigraphy of the Tibetan plateau, revealing the presence there of rich mineral resources. Others of interest from a mining point of view—are one, carried out in 1958, to the northern part of the Provinces of Chinghai and Kansu, in north-west China, for a re-evaluation of the petroleum reserves there and for study of the routes and methods by which pipelines may be put down from these; and a survey of the Heilungkiang-Amur river basin, conducted in co-operation with scientists from the U.S.S.R., for the investigation of its mineral reserves and the possibility of constructing a canal to link these, via the Sungari and Liao rivers, with the Gulf of Liaotung, on the Yellow River.

It is reported from Peking that China produced 80 per cent more mining machinery during 1959 than in 1958. This included complete sets of large and complex plant for the entire equipment of new mines.

This achievement is the result, it is stated, of priority having been given in the machine-building industry to the production of geological drilling rigs, excavators, rock drilling machinery, hoisting machines, crushers, pulverizers, ore dressing machinery, etc. of a variety of types and sizes. These included a new cable-drawn hoisting machine, of Chinese design, for which it is claimed that it works four times as fast as is usual, consumes half as much power, and—a most important factor at the present time in China—requires only one-third as much materials for its construction. It will probably be shown at the forthcoming Leipzig Spring Fair.

The report adds that the continual extension of mechanization in China's mining enterprises, due, surprisingly enough, to labour shortage resulting from the simultaneous undertaking of innumerable projects, often on a colossal scale, means that the expanded production just mentioned is far from sufficient to meet the needs of the Republic. China seems likely, therefore, to be at the Leipzig Fair as a buyer, in this field, as well, perhaps, as an exhibitor, a fact which could be of interest to British manufacturers of mining machinery and equipment.

## BRITAIN'S COAL INDUSTRY IN 1959

The main task of the U.K. coal industry in 1959 was to meet a continuing and substantial fall in demand without causing extreme hardship to the mining community or seriously reducing the industry's future production capacity.

The world-wide coal surplus continued in 1959 and the total consumption of British coal, which had fallen by 20 million tons between 1956 and 1958, decreased by another 13 million tons. In addition, consumers' and pipeline stocks fell by 5 million tons. The Board reduced deepmined coal production by 6 million tons mainly by closing 58 pits (making a total of 90 in two years) and reducing the labour

force by cutting down recruitment. In addition, opencast output was cut by 3½ million tons. Total output last year was 206 million tons and despite the fact that this represented a drop of almost 10 million tons compared with 1958 the increasing gap between production and demand resulted in a rise in stocks to the unprecedented level of 50 million tons.

Despite these difficulties, the industry made more significant advances in operational efficiency than in any year since nationalization. Productivity was at record levels, and the improvement of 6 per cent O.M.S. on the face and 5.3 per cent overall, were the biggest increases recorded for more than 30 years. This improvement in productivity was largely responsible for a fall in production costs of 1s. 9d. a ton compared with 1958, although the burden of overheads was proportionately higher because of reduced output.

During the first quarter of 1959 there was a surplus of £6,400,000; thereafter results deteriorated because of the loss incurred in stocking of large tonnages of coal and coke. Although the final accounts covering the year's activities are not yet available it is known that an overall loss was incurred.

#### NEW ZEALAND ALUMINIUM PROJECT

As foreshadowed in our last week's issue, the agreement between the New Zealand Government and Consolidated Zinc Pty. Ltd. was signed this week. It provides for the company to investigate the potentialities of the Te Anau Manapouri Lakes system as a source of electric power for what might become a £100,000,000 aluminium smelting industry. If the company decides, after the investigations, to proceed with the plant, the agreement binds it to build by 1961 a works with a designed installed capacity of at least 100 megawatts of power. Full power potential—estimated at over 600 megawatts—must be developed by 1991.

It should be emphasized that, as previously stated, the agreement covers only the first exploratory stage. As pointed out in Brisbane last week by one of the company's directors, Mr. C. A. Byrne, two other sites are also under consideration and a final choice has still to be made. The purpose of the agreement is to facilitate the fullest investigation of power resources so that they could be compared with those in the other locations being considered. One of the other possibilities under investigation is to set up the plant in Queensland and use steam-generated power from Callide open cut coal. The company is also studying the possible use of hydro-electric power from the Purari River, 200 miles west of Port Moresby in Papua.

Mr. Byrne further stated that the smelting industry investigations would not affect the establishment in Queensland of the alumina treatment plant at Weipa, to be built at a cost of about £45,000,000, which will produce alumina from bauxite mined at Weipa.

#### SILICOSIS IN CANADIAN MINING

The findings and recommendations of a qualified specialist in pulmonary diseases, following an independent survey of the silicosis hazard in mining operations, covering nearly two years, are contained in a report by Dr. John F. Paterson, now ready for distribution by the Ontario Department of Mines.

Dr. Paterson was commissioned by the Department in 1957 to make a thorough review of the situation as it applies to hard-rock miners in Ontario. In the course of his survey he made exhaustive studies of the diagnostic and preventative measures employed in the mining areas of the province. His

report includes statistics which show most emphatically a reduction in the number of cases of silicosis reported, from 127 in 1926 to seven in 1958; an increase in the average age of the victim from 39.7 years in 1926 to 62.9 in 1958; an increase in the time of exposure to dust of those contracting silicosis before the condition develops, from 12.6 years in 1926 to 22.9 years in 1958.

In his summary Dr. Paterson expresses the opinion that the approach to the problem has been generally sound, but he feels there is need for the establishment in Canada of a pneumoconiosis unit to carry on a complete research programme.

In acknowledging the large-scale effort to prevent silicosis by aluminium prophylaxis, it is pointed out that the medical statistics of the Workmen's Compensation Board show that to the end of 1956 there was no case of a miner developing radiological silicosis whose mining activities had been confined to Ontario and who had taken aluminium prophylaxis from the time he started mining. There is further stated to be no evidence that inhalation of aluminium powder in the quantities used in prophylaxis will cause pulmonary damage. However, Dr. Paterson adds that because of the complexity of the problem of assessing the improvement in the silicosis record, he is unable at the present time to give a definite opinion as to the value of this method of treatment.

The most important preventative measures, Dr. Paterson says, are effective dust control and ventilation.

#### GERMAN-GREEK AID PROGRAMME

Full details have now been issued of orders placed in West Germany by the Greek authorities under the German-Greek aid programme involving a total of £1,250,000 over a period of five years. Most of the orders concerned are connected with the exploitation of the country's natural reserves. The orders, in so far as they are connected directly with the mining and minerals industry, are as follows:

*Ptolemais brown coal deposits:* An order has been placed with a Dr. Ehlers, of Federal Germany, to assess within an initial period of four months the 280 borings already made in the deposit area, to carry out within a period of from six to twelve months about 150 new borings with a total depth of 12,000 metres in new regions of the Ptolemais area, and at the same time—and within ten months—to draw up a plan for the expansion of the brown coal exploitation at Ptolemais and for the ordering of necessary plant and equipment. Maximum costs for the planning are set at 1,584,000 German marks (some £132,000) plus 1,500,000 marks for the carrying out of boring and 180,000 marks for the purchase of two borers (together about £140,000).

*Megalopolis brown coal deposits:* An order has been placed with the Ingenieurbüro Dr.-Ing. O. Gold concern, of Cologne, for the development of the brown coal deposits at Megalopolis, in the Peloponnese. The boring of from 80 to 100 boreholes with a combined depth of some 8,000 metres is to be carried out within four months and the planning of possible development itself within ten months. Costs are an agreed 200,000 marks fees and a maximum of 1,232,000 marks (together equal to some £119,400) for on-the-site work.

*Greek soda industry:* An order for planning of the development of the country's soda industry has gone to the Batelle-Institut, of Frankfurt-on-Main, the planning to be completed in nine months and to cost no more than 161,500 marks plus 154,000 drachmae (together some £15,300).

*Ferrous metals:* Studies are to be undertaken into the development of the Greek ferrous metals industry by Dr. Lueth and Professor Dürer, of Zurich. Planning is to take eight months and cost up to 314,000 marks (£26,200).

# CANADIAN MINING POISED FOR FURTHER EXPANSION

**H**EARTENED by good sentiment for copper, nickel and iron and by steadily improving earnings for the producers, Canada's mineral industry has entered 1960 on a note of marked confidence.

Signs of loosening credit restrictions and the return of public confidence to speculative mining markets are suggesting a broadened search by prospectors for new sources of metals at many distant points in Canada.

Gone is the feeling of pessimism that gripped the industry, at times, last year when producers were emerging from a lengthy period of depressed metal prices and the tightening of credit strings by the Central Bank at Ottawa.

Thwarted by the absence of an outstanding find in 1959, prospecting activity and new development centred primarily in the hands of the well-heeled mining corporations bank-rolling exploration. Other major undertakings, resulting from previous years' search, were financed mainly by United States steel interests engaged in gearing Canadian iron ore deposits for later production.

But, now bolstered by an exceedingly bright-looking recovery in production, profits and dividends in 1959, the industry is looking for a banner year in 1960.

First major deposit to hit production in the current year will be International Nickel Co. of Canada's Thompson Lake venture in northern Manitoba. Hematite iron will also start flowing from Caland Ore deposits, adjoining Steep Rock Iron Mines, in the Atikokan district of Ontario.

The Chibougamau copper camp in northwestern Quebec will be greeting a new producer in Copper Rand, which is also planning to treat custom ores from neighbours like Chib. Jaculet, Bouzan, Portage Island and others.

The North Coldstream concentrator is being reopened, under direction of Noranda Mines, now that copper has stabilized at a figure suggesting a satisfactory profit for the northwestern Ontario copper operation.

Future productive laurels for Canada, however, lie a few years hence when the vast beneficiating magnetite iron ores of northeastern Quebec are geared for production. This is the province which is expected to account for, by far, the greatest dollar expenditures in Canada in the current year.

Three major iron ore developments in the province of Quebec, entailing multimillion dollar expenditures on open-pit development, power projects, townsites, docks and railroads, will provide some 20,000,000 tons to Canada's iron ore productivity by 1962. These undertakings are in the hands of Wabush Iron Company, Iron Ore Co. of Canada and Quebec Cartier Mining Co. Bulk of funds has been provided by United States steel interests.

Additional iron ore projects are underway or are expected to commence in the near future at various locations in Ontario. One of these is the magnetite deposit of Iron Bay Mines which is currently being investigated by Cleveland Cliffs, another American concern. Decision to proceed with this programme would require railroad construction, power development, townsite, etc. not too far off the well-known Red Lake gold camp.

Out on the west coast, Consolidated Mining & Smelting Co. of Canada, is erecting a \$20,000,000 iron and steel smelter for production of pig iron, steel ingots and rolled steel products. Capacity will be over 100,000 tons annually.

The COMINCO project at Kimberley, site of the world-renowned Sullivan mine, will recover iron from iron tailings stockpiled over a long period of years together with the iron content from current mining operations.

To the northeast, on the south shore of Great Slave Lake, COMINCO's subsidiary is expected to commence aggressive mine-gearing once the green light is given by the Federal Government for the construction of a railroad to the site. Vast reserves of lead and zinc ores have been established by rather exhaustive diamond drilling in the past.

An early decision is also expected to be made by Noranda Mines, McIntyre Porcupine Mines and Canadian Exploration Ltd. — co-owners of Mattagami Lake Mines — regarding initial shaft sinking to develop large tonnages of lead, zinc, copper and silver ores in the Mattagami Lake district of Quebec.

Decision to carry this extensive ore deposit to production would likely signal more advanced programmes for such other area operations as Orchan and New Hosco, where ore deposits have been established by diamond drilling.

There is also the possibility that St. Joseph Lead Co. might make a final commitment to bring the Brunswick Mining & Smelting Corp. deposit to production in New Brunswick. Extensive metallurgical work has been conducted on this deposit and productivity merely hinges on the decision of the American corporation to advance expenditures.

Besides Canada welcoming INCO's Thompson Lake deposit to production this year, programmes are also proceeding at other locations which could result in additional nickel and copper ores being added to future production.

## By CLAUDE H. TAYLOR

Falconbridge Nickel Mines is currently diamond drilling the Marchant Mines' high-grade nickel deposit in LaMotte township, Quebec, as a means of expanding ore reserves there. Arcadia Nickel Mines, adjoining an INCO operation in the Sudbury district, is considering reopening if a satisfactory treatment contract can be arranged. The company was forced to suspend work during the surplus nickel period when funds ran out and work was discontinued in installation of equipment for the 1,000-ton concentrator. This property could be brought to production quickly.

In northwestern Ontario, Nickel Mining & Smelting has reopened its mine where underground diamond drilling is underway as a measure of attempting to expand higher-grade ore tonnages. Faraday Uranium Mines, building up a substantial cash position on a government uranium contract, has agreed to provide the desired capital to bring this mine to production, if tonnage and grade warrant.

A handful of initial underground jobs will be undertaken this year on copper and gold prospects in Ontario and British Columbia. Recent gold discoveries in the Yellowknife area of the Northwest Territories could also result in more advanced programmes being undertaken in that remote part of Canada.

It is a certainty that with the brightened outlook for most metals, the top-flight mining corporations of Canada will use well qualified field scouts and maximum numbers of prospectors in exploration of Canada this summer. It is apparent the younger companies also will be on the outlook for promising mineral showings.

The rather confused Canadian uranium picture of the past few years now appears to be resolving. The recent stretch-out of contracts, to permit new arrangements being made by contract holders unlikely to pay off funded debts, is now in force.

Rayrock Uranium Mines, forced to close down due to lack of ore but still holding an unfinished contract, has completed arrangements with Gunnar Mines to fill the uncompleted portion. In this manner the lifespan of Gunnar's production has been extended, the company will derive a profit from the arrangement, and Rayrock will end up with a \$5,000,000 gross profit. Prior to the stretch-out arrangement Rayrock stood to receive nothing.

Canadian Dyno Mines is also concluding arrangements to sell its contract to Gunnar. Proceeds will permit the company to pay off debentures and build up a sizable cash position. Negotiations are also underway with other concerns holding contracts they cannot service in time to pay off funded debt before they expire, even under the stretch-out consideration.

The overall brightened outlook for Canadian mining is currently reflecting itself on the stock market. Should this optimism prevail it can be taken for granted that raising of risk capital will improve, and more funds will be available for prospecting and exploration to establish the new ore reserves of the future.

## MINERAL STOCKTAKING IN NORTH VIETNAM

VIETNAM has long been known to be rich in minerals. The Government of North Vietnam has more or less completed an extensive survey of the mineral resources of that part of the country, north of the 17th parallel, which is at present under its administration.

The mines of the Hongay - Cam Pha - Quang-yên coalfield, on the coast have long yielded a considerable quantity of high grade anthracite. Production last year (1959) of some 2,000,000 tonnes represented a spectacular recovery from the low level, of 600,000 tonnes, to which it had been reduced five years earlier, as the result of the eight-year war of Liberation. Reserves were estimated, by the French, as being of the order of 250,000,000 tonnes, but a revised estimate places them at nearer 12,500,000,000 tonnes, and as extending up the coast right to the Chinese border.

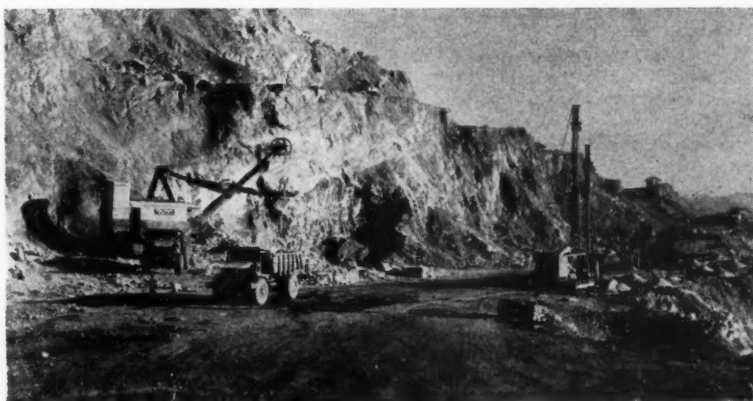
In close proximity to these coal deposits are occurrences of iron ore, estimated at some tens of millions of tons. These are located at Thai-nguyên, Hà-tĩnh, Nghệ-an, Thanh-hoa, Yên-bai, and a number of other places, and will provide the basis for an integrated iron and steel works now in construction, with Soviet help, at Thai-nguyên, which is to have an initial annual capacity of 100,000 tonnes of steel. Other metals which have been discovered include manganese, at Hà-tĩnh, chromium (estimated at some tens of millions of tonnes of ore), at Thanh-hoa, lead and zinc (estimated at some tens of millions of tonnes of ore), at Yên-bai, tin (estimated at some tens of millions of tonnes), at Cao-bang and Pia-uac, wolfram, also at Cao-bang; and antimony, at Mông-cai, Hongay, Thât-khê, Tuyên-quang and Thanh-hoa. The Cao-bang deposits have been found to contain also some

silver and cobalt, while there have been discoveries of mercury at Hà-giang, aluminium at Lang-son, and gold at Hoa-binh, Bac-can, Bông-miêu and Kim-son.

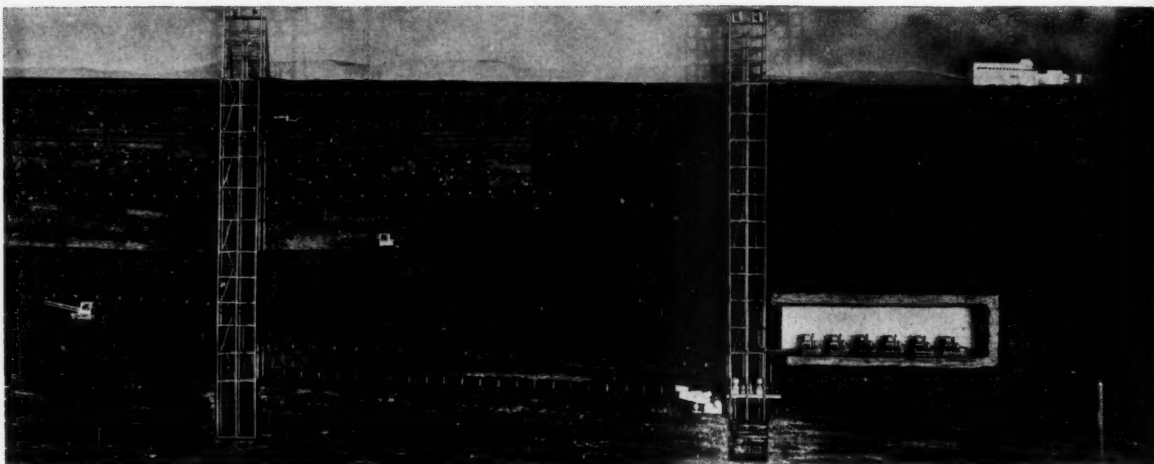
Among the non-metallic minerals which have been located, are very large deposits of apatite at Cam-duong, in the Province of Lao-cai, which are being actively exploited. This mineral is at present being mainly exported, but it will be the basis for the production of superphosphate at a second industrial centre, with a variety of industries, which is in construction at Viet-tri, at the junction of the Red, Clear and Black Rivers. Other minerals which have been located are asbestos at Hoa-binh; mica at Phu-tho; chalk at Quang-yên; marble at Quang-nam and Son-tây; and white sand, suitable for glass making, on the island of Van-hai (Hông-quang).

It is not stated which of the foregoing mineral deposits are already being exploited. On December 29, however, the Vietnamese Government announced that 22 "above-norm" factories and mines were completed and put in operation during 1959, bringing the total number of these which have been completed during the past five years, following the Liberation, up to 108.

It seems probable that extractive industry will receive high priority in the future economic planning of the Democratic Republic of Vietnam. Judging by the way in which mining and dressing has been mechanised, as seen by the present writer at the Hongay coalfield and the tin mine at Cao-bang, there is a promising potential market there for the export of mining machinery from this country, if suitable terms of payment or credits can be arranged.



Coal Mining operations at Cam Pha



## MINING GILSONITE

BY

HYDRAULIC

METHODS

*In "The Mining Journal" for February 28, 1958, page 238, a description was given of the new hydraulic methods adopted for mining gilsonite by the American Gilsonite Company, at Bonanza, Utah. Now, after nearly three years of operational experience, this system of hydraulic mining, with minor modifications, is claimed to have proved as efficient or even more efficient than was at first anticipated. Illustration depicts a model of a gilsonite vein showing the new hydraulic mining methods developed.*

**G**ILSONITE is a solid hydrocarbon of brownish colour but having a black lustre with a conchoidal fracture, a hardness of 2 and a specific gravity of 1.05, which, in America, occurs in vertical fissures that cut the sandstone and shale beds of the Uintah formation in S. E. Utah. It is brittle at normal temperatures, softens at temperatures above 275 deg. F and, although it will not burn in the solid state, its dust is highly explosive and is a constant hazard with dry mining methods. The workable portions of the veins in the Green River shales vary in depth from a few feet to 1,500 to 2,000 ft. and in width from a few inches to 22 ft. tending to narrow with depth.

Because of the dust problem, two wet methods of mining were adopted by the American Gilsonite Co. and these also reduced the need for hand labour in the actual mining operations. Following the sinking of a deep shaft into a gilsonite vein, which must be at least 6 ft. wide, drifts are cut from either side of the shaft into the vein by means of a jet-cutting car. The ore is broken away either by a powerful jet of water at high pressure or by means of a cutting head with carbide-tipped teeth assisted by jets of water.

In those veins where the gilsonite contains tiny cracks or fractures a powerful jet of water, issuing at a pressure of 2,000 lb. p.s.i. and at a rate of 82 g.p.m. from a  $\frac{1}{4}$  in. nozzle at the end of a hydraulic boom is played on the surface of the ore. The stream of water penetrates the fissures and the ore breaks apart, falling to the bottom of the drift. Initially, the hydraulic jet was mounted on a jeep chassis but this did not possess sufficient mobility for the purpose and the outfit was transferred to a track-type vehicle sufficiently small to operate within walls 6 ft. apart. This unit can be easily assembled and dismantled for moving from one part of the mine to another, power being furnished by an air motor.

### The Hydraulic Unit

Two booms are mounted on the chassis. An upper pipe carries the high pressure water for the cutting operation and delivers it at a velocity of six miles a minute. A lower pipe carries low pressure water, which, together with the flow of the high-pressure cutting water, now expended of energy, washes the ore down the drift to the main shaft where it

falls into a receiving pocket. About 350 g.p.m. of water is carried in the fluming pipe for each jet. Although the cutting rate per jet is normally between 25 and 30 tons per hour or 50 to 60 tons per hour per car, rates as high as 100 tons per hour have been achieved. This represents 200 cu.yds. of broken ore per hour. The vehicle is operated by two men each of which controls one boom.

Water and air are supplied to the cutting vehicle by hoses which are attached to the pipelines and follow the vehicle during operations. When the vehicle moves beyond the range of the hoses they are disconnected from the vehicle and the set from the next supply pipe attached. The high-pressure hose is 1½ in. in diameter and low pressure hose 3 in. in diameter. Normally, 150 ft. of hose is used from each supply pipe and the latter are spaced 250 ft. apart in the stope. Three-inch high pressure piping is also installed in the entry under each pillar and, at 250 ft. intervals, pipes and manways are carried downward to within 20 ft. of the floor. Valves are installed at each take-off tee and at the end of the pipe.

The broken ore and the water used for flushing it move by gravity to a screen which passes the plus ¾ in. material to a crusher and thence with the —¾ in. material into the sump. Here, the ore and water are mechanically agitated preparatory to being pumped 800 ft. vertically to a slurry preparation plant at the surface by five horizontal centrifugal pumps working in series.

Incidentally, it has been brought to the notice of the American Gilsonite Co. that the Russians have been using water jets for 15 to 20 years to facilitate coal mining, but this practice has been based on low pressure water of a maximum of 700 lb. p.s.i. and large volume. This was necessitated by the fact that high pressure pumps and pipings were not available to them. While the Russian reports have yielded much valuable information the Americans believe that their own experiments might have failed had they followed Russian lines. The initial American attempt at hydraulic jet cutting was with the use of water at a pressure of 1,600 lb. p.s.i. This was not successful, but, at the same time it indicated that a pressure of 2,000 lb. p.s.i. might be satisfactory. Subsequent experiment, using pressures of up to 2,300 lb. p.s.i. showed sufficient promise to serve as a basis for the design and operation of their present system.

#### A Rotary Drill

Another type of ore cutting tool developed by the American company consists of a long rotary drill armed with carbide-tipped teeth. The drill cuts a large swath through the ore and, meanwhile, streams of water pour out through the teeth, keeping the ore constantly wet throughout the entire operation. Here, again, the ore is washed down the drift to the main shaft, is dewatered and hoisted to the surface.

Stoping in the mine is carried out by underhand methods, a 10 to 12 ft. high bench being advanced the full length of the stope, which may vary from 1,000 to 1,500 ft. To assist the flushing away of the ore, the floor of the stope is left at an incline of five per cent and, to this incline, floors, timbering and bolting are kept parallel. Planks, 3 in. by 10 in. by 10 ft., are installed parallel to the stope floor by roof bolts on 8 ft. centres. Where the wall conditions require it, lagging can be installed behind the planks by the use of 2 in. blocks placed under the planks at the bolts. Floors are placed across the vein and are supported by the 3 in. planks at 48 ft. vertical intervals. On the floors, a wooden centre strip is installed to serve as a roadway for pneumatically-tired timber trucks. This floor, therefore, not only acts as a means of entry for supplies but also serves as a protection from falling rock. Pillars slightly deeper than the width of the vein are left at 250 to 300 ft. vertical intervals. Here,

the company tries to pick an offset or a weak strata of rock in which to leave the pillar. Drifts under these pillars are driven by hand operated jets pivoted on a pneumatic bar.

When a drift is completed, the cutting machine returns to the shaft, begins a new drift and repeats the entire operation.

At the surface, the ore is treated either to produce various sizes for the trade or for delivery by pipeline to the new refinery and coke processing plant of the American Gilsonite Company at Gilsonite, Colorado, 72 miles away.

In the case of the former, the ore is dewatered underground before being hoisted to the surface, where it is crushed and introduced into the water again to flow by gravity pipeline to a drying plant at Bonanza. Here, the +¼ in. material is removed by screening. The —¼ in. material is put through a centrifuge, the centrifuge gilsonite and the +¼ in. gilsonite from the screen being mixed and sent to a fluidized bed dryer, where hot air is blown through the gilsonite until it dries to less than 0.5 per cent moisture content. This is a continuous process dryer. The product from the dryer is again screened to the various sizes required for the trade. Effluent from the centrifuge is piped to flotation cells where gilsonite and water are separated without the addition of reagents.

#### Pumping Operations

Ore destined for the refinery is pumped to the surface, passed over a dewatering and sizing screen and the maximum size particles are reduced by crushing to —¼ in. before water is again added to obtain a 40 per cent by weight solids concentrate for pumping to Gilsonite, Col. The resultant slurry is cleaned in a hydrocyclone process that eliminates the sand, rock and other tramp materials, the gilsonite itself being an exceptionally pure mineral, free from foreign matter, low in sulphur content and having only traces of other minerals. After cleaning, the slurry is stored in 5,000 bbl. tanks and agitated to keep the material in suspended form. Excess water is returned to the mine for reuse in the fluming process.

High pressure water for the mine is produced by a 10-stage horizontal, 3,900 r.p.m. centrifugal pump, driven by an 800 h.p. diesel engine through a speed increaser. This pump is also used to inject water into the Bonanza-Gilsonite pipeline to keep the slurry moving in case of power failure of the electrically driven plunger pumps. An adequate water supply is available from the nearby White River. There is no electric or combustion engine power whatsoever in the mine, except at the pumping stations, which have permissible electric motors and lights. These pumping stations are sealed off from the rest of the mine by draught doors and by a pressure and exhaust air system. It is expected that a shaft will be sunk every two-and-a-half miles on the vein for the installation of pumping stations.

The cost of winning gilsonite ore by the hydraulic jet method, including labour, materials and maintenance of equipment, but not including overheads, supervision, depreciation, etc. are now about \$0.35 per ton. Part of the success of the process is attributed to the equipment manufacturers who developed special equipment for the company's use, such as the high pressure coupling used in connecting the 3 in. schedule 80 pipe underground and the lightweight high pressure hose that facilitates the use of the small tractor.

Early in 1958, 700 tons a day of gilsonite were flowing into the processing plant, where the daily output was 275 tons of calcined coke, 1,300 bbl. of petrol and varying amounts of fuel oil, which were being used as fuel in the refinery. The three 300 h.p. pumping units were maintaining a pressure of 2,200 lb. p.s.i. and a flow rate of 350 gall. per min. The pipeline itself held some 600,000 gall. of water.

## THE COAL INDUSTRY IN EUROPE: ITS PROBLEMS AND PROSPECTS

A SURVEY entitled "The Coal Situation and Prospects in Europe in 1958/59" has been prepared by the Secretariat of the Economic Commission for Europe. It is an attempt to analyze the reasons behind the current difficulties in the coal market and their repercussions on the coal industries.

The report outlines the circumstances which have led up to the present difficulties in the coal market and discusses the various measures which have been taken in the countries affected to cut back output. Up to the end of 1958, although short-time working in Belgium and Western Germany and the cessation of the voluntary Saturday shift in the United Kingdom entailed a reduction in miners' earnings, no miners lost their jobs. In the first eight months of 1959 there was some redundancy in Belgium, the United Kingdom and Western Germany, but measures were being taken to find alternative employment for redundant workers.

Industrial activity has already begun to recover. It is apparent, however, that it will be some time before the improvement in economic activity can lead to an increase in the demand for coal and a very considerable time before the surplus stocks accumulated both at pit-head and with consumers can be absorbed. This will prolong the time necessary for the present difficulties in the coal industry to be overcome.

In the long run, western Europe will require much more energy than it now consumes and, providing coal is competitive with other forms of energy, there is room for coal consumption to increase. There is no indication that expansion in those sectors where coal is especially indispensable or suitable, e.g. blast furnaces, thermal power stations, will slacken and therefore that coal consumption will not increase in these sectors. In those sectors where alternate forms of energy can easily be substituted—e.g. railways, general industry, domestic—coal is likely to lose ground. To what extent substitution in these sectors will offset the increases in the former group will be largely determined by the competitive position of coal *vis-à-vis* other forms of energy, mainly oil and natural gas.

Since the middle of 1957 there has been an excess of supply of energy over demand. The question arises, as to why the surplus supply situation has exclusively affected the coal industries. It would appear from an examination of the widely differing conditions in the countries most affected that factors of a structural nature are, at least in part, responsible. In the United Kingdom, for instance, where imports of coal have been suspended since early 1958, coal previously was solely imported by the National Coal Board in line with requirements of special qualities and sizes in short supply; hence competition from imported coal has nothing to do with present difficulties. In Western Germany, where factors of a structural nature are also playing a big role in the present situation, sales of indigenous coal are detrimentally affected by long-term import contracts. In Belgium, unfavourable geological conditions impose higher

than average costs on the producers. Any weakening of demand immediately leads to marketing difficulties because of an influx of imported coal.

A number of emergency measures have been taken in some countries to put a brake on coal imports, but these are temporary expedients which those responsible for imposing them have stated will be rescinded when the situation has improved. The question therefore arises as to whether the essentially temporary measures adopted to cope with the present situation can be regarded as being sufficient.

An outstanding feature of the present situation has been the severe competition from oil. A number of new sources of supply of oil have been developed and supplies from the traditional ones have been expanded. The output of natural gas is also expanding fast. There is thus an increasing pressure of various forms of energy from many different sources of supply coming on to the market.

A further new element in the situation is that gold and hard currency reserves in a great number of west European countries have improved considerably so that the dollar problem is unlikely to have the same impact as previously on oil or coal purchases. Furthermore, recent convertibility measures have made the dollar's advantage over all other currencies less overwhelming.

An uninterrupted flow of coal and oil imports may lead to renewed difficulties. In the long run the level of coal output will be increasingly determined by competition from imported coal and from other fuels; this means that the coal industry must reduce its cost to a competitive level. Recent increases in productivity in the mines, and the measures taken to close high cost pits, have shown that the industry is prepared to adapt itself. But demand is liable to fluctuate and when demand falls temporarily the coal industry cannot quickly adapt itself to the fall without serious financial and social consequences. There is also a danger that measures taken to reduce output might entail a reduction in capacity which is more than the long-term prospect justifies. There is, therefore, an increasing pressure in a number of countries to adjust imports to home production and to ensure that the coal industry has a chance to compete with other fuel suppliers under similar conditions.

The coal industries in eastern Europe and the USSR are not encountering difficulties of a similar nature to those in western Europe. There has recently been a profound improvement in coal supplies in this region due to a number of factors which are likely to affect future prospects. Indeed, 1958/59 witnessed both a qualitative and quantitative shift of emphasis in long-term coal planning in a number of countries in the region.

Additionally, there are wide differences in the proportions in which unprocessed coal is divided amongst the final end-users. In western Europe 45 per cent is used in industry, 18 per cent in transport and 37 per cent in the domestic and miscellaneous sector. The outstanding difference in the USSR is the much greater relative and absolute proportion

consumed on the railways. The same feature is observable in eastern Europe although to a less marked extent. A comparison of the consumption of all forms of energy between western Europe and eastern Europe shows, however, a much more similar pattern of end uses than if hard coal is looked at in isolation. These differences in the way in which coal is used go some way in explaining the recent changes that have occurred.

Coal production continued to expand in Eastern Europe and the U.S.S.R. in 1957 and in 1958.

The coal situation in this region at the end of 1958, as shown by the stock situation, had reached a state of equilibrium between supply and demand. On the one hand, pit-head stocks were stable and represented a small proportion of output and, on the other hand, distributed stocks had risen somewhat over the levels of the past few years and were sufficient to give consumers adequate working margins.

The increases in coal production attained in eastern Europe and the USSR in 1957 and 1958 were the principal causes of the improvement in coal supplies in the region. Prior to that, when there was an overall tension in the coal

market considerable difficulties arose in the coal importing countries—Hungary and Eastern Germany—while the major producers in order to satisfy their own requirements were obliged to place limits on their export availabilities. The discovery and development of new resources of oil and natural gas have also contributed to the changed situation.

The long-term plans for hard coal show an increased emphasis on the output of coking and gas coals and also on measures to increase productivity and reduce costs. At the present time measures are being taken to review plans for the development of lower grade brown coal and lignite. All this suggests that while the policy of maximization of coal output has not been abandoned, as it is in the process of being in western Europe, it is being modified, especially in the USSR, to take greater account of qualitative and cost considerations and the greater availability of lower cost energy. While therefore coal is the main source of energy in eastern Europe and the USSR and is likely to remain so, at least until the advent of nuclear energy on a large scale, the share of coal in total energy is likely to diminish relatively in the future.

## MINERALS IN ARGENTINA

ACCORDING to a special article published in the June 14, 1959, issue of *Clarín*, a Buenos Aires newspaper (as quoted in Mineral Trade Notes, December, 1959), Argentina is rich in potential mineral resources. The article urged that serious efforts be made to exploit the country's mineral wealth through the intensification of exploration, introduction of modern mining techniques, and the encouragement of private capital investment. The article also stated that only a limited section of the country had been geologically surveyed, and that the National Mining Administration, which is the official agency charged with technical mineral study, lacks the elementary resources to perform its mission.

The country's various mineral deposits were described in the news article as follows:—

**Iron ore.**—Important iron ore reserves are found in the Zapla and Puesto Viejo deposits in Jujuy Province and in the Sierra Grande deposits in Rio Negro Province.

**Manganese.**—Manganese has been exploited in Argentina since 1918. The rate of exploitation is expected to increase when the plant at San Nicolas begins operating. Production centres are in the north of Cordoba and in the south of Santiago del Estero. Important deposits of manganese also occur south of Mendoza and in Santa Cruz.

**Lead, silver, and zinc.**—More than 90 per cent of the lead and almost all of the zinc output is produced by the Aguilar mine in Jujuy. Lead is also found in San Juan, La Rioja, Mendoza, and throughout Patagonia.

**Tungsten and bismuth.**—Almost all of the tungsten and bismuth produced in Argentina since 1908 has been exported. The numerous deposits are distributed over vast zones at San Luis, Cordoba, Catamarca, La Rioja, and San Juan.

**Gold.**—Gold is found both in veins and placer deposits. Gold-bearing mineral deposits are found in Jujuy, Catamarca, San Juan, La Rioja, Neuquen, and San Luis.

**Beryllium.**—Exploitation of beryl was commenced in 1935 and reached a production peak of 2,186 tons in 1941. Principal centres of production are in San Luis, Cordoba, and Catamarca.

**Uranium.**—Uranium-bearing minerals have been found in deposits of columbite and tantalite in Cordoba since 1948. Interesting deposits have also been found in Cata-

marca, La Rioja, San Juan, Mendoza, San Luis, Neuquen Chubut, Salta, and Rio Negro.

**Columbite, tantalite, and lithium.**—These minerals are found in Salta and San Luis.

**Copper.**—Argentina is not self-sufficient in copper minerals. Copper is found in Mendoza, Salta, San Juan, Catamarca, and Jujuy.

**Tin.**—Cassiterite, the principal tin mineral, has existed at La Rioja and Catamarca since it was discovered in 1809. Discovery of important deposits of cassiterite in Jujuy in 1930 supplied domestic consumption needs. It is hoped that tin mining can be recuperated at the Cerro Galan deposit, which is now under study. This deposit is a continuation of the Pirquitas mine.

**Sulphur.**—Deposits of sulphur are found in Neuquen, Salta, and Mendoza.

**Kaolin.**—Among non-metals, kaolin and other clays constitute one of the most important elements of exploitation, not only because of the sales within the country but also because of the volume of exportation. The production centres are Chubut, Buenos Aires, Catamarca, Jujuy, La Rioja, and San Luis. By volume, clays are one of the most important mineral exports. They are found in Comodoro Rivadavia, Mendoza, Cordoba, Neuquen, and Salta.

**Bentonite.**—This mineral is found at Mendoza, San Juan, Neuquen, and Chubut.

**Borax.**—The demand for borax is irregular. The country's source of supply is at Salta and Jujuy.

**Salt.**—Salt deposits are found throughout the country.

**Mica.**—The growth of all Argentine industry has increased the internal consumption of mica, thereby limiting the export of this mineral. Production areas are at Cordoba, San Juan, San Luis, and Catamarca.

**Fluorite.**—Rio Negro ranks first in the production of this mineral, for which demand has been accentuated during recent years, especially since the installation of blast furnaces at San Nicolas.

**Stone, sand, and gravel.**—Major production by volume belongs to sand, gravel, pebbles, limestone, and marble. The principal production areas are Mendoza, San Juan, Cordoba, San Luis, Buenos Aires, and Salta.

## Machinery and Equipment

# A Belt Conveyor Idler Structure

As is well known, the troughing angle of a belt conveyor idler must be sufficiently shallow for the empty belt to trough down into contact with the centre roll for effective belt training. For maximum carrying capacity and elimination of spillage the troughing angle should be as deep as possible. These two opposed requirements result in the compromise angle of the conventional troughed idler now in general use.

With the suspended idler structure manufactured by The Mining Engineering Co. Ltd. the idlers trough under load and thus both requirements are met fully. Shallow troughing with no load gives excellent training of the empty belt. Deep troughing under load, combined with the resilience of the idlers, gives an undulation-free passage for the belt and spillage is largely eliminated. The smooth running of the loaded belt reduces to a marked degree the dissemination of dust through the belt joints. The structure has been operating since mid-1959 after extensive trials and patents have been applied for.

The structure itself is light, easily transported, stacks compactly and is erected or dismantled entirely without the use of tools. When assembled it possesses considerable lateral rigidity to maintain alignment. The troughed idler rolls and the return rollers are of Meco design running on high grade ball bearings, grease packed and effectively sealed.

The deep troughing of the carrying belt under load makes possible the general use of simple open structure but cover plates for the bottom belt can be fitted if desired near loading points. The structure may be floor mounted or slung. Structure stools are fabricated from rectangular tubes giving lightness combined with great strength and rigidity. The 4 in. dia. return roller carries the belt 12 in. above floor level and is positioned above the cross member so that the return belt can be run out over the rollers without threading. The roller is adjustable for belt training purposes and the clearance through the stool is belt width + 8 in. The stool cross member is well above floor level to give ample clearance for cleaning out.

The stringers are tubular and are secured in the open channel tops of the stool side members by simple knock-in pins. Steel pressings clip over the stringers and are located by counter-sunk spigots entering holes drilled in the tubular stringers; they receive and position the suspended idler. Headed pins passing through both the pressings and tubular stringers, are removable to allow the idler to be adjusted to train the carrying belt.

The long connection between stringers and stools gives the assembled structure a good measure of lateral rigidity to maintain alignment yet affords vertical flexibility to follow floor undulations. Tubular stringers are light and convenient for handling and storage. Further, they give the resilient strength required for this type of conveyor structure. Where covered bottom belt is required, channel stringer and cover plate structure is used and the suspended idlers are carried in cradle mountings.

The troughed idlers comprise three rolls flexibly coupled together by flat chain links. The rolls are of standard Meco design employing accurately machined iron castings housing high grade ball bearings mounted on ground steel spindles. The bearings are grease packed and protected by efficient sealing units and the whole design is such that servicing can be carried out simply and quickly without special equipment. Housed entirely within the side rolls are heavy spring assemblies coupled to hooked bars upon which the idlers are resiliently suspended, the sliding coupling being protected by a bellows seal. The hooked bars clip over the tubular stringers of the structure and the idlers trough against the spring loading in relation to the weight of material on the belt up to the limit imposed by the restriction of the spring yield. For empty belt the idler troughing angle is approximately 20 deg. which allows even the stiffest belting to make full contact with the middle roll for effective belt training. The troughing angle then increases progressively with load up to a limit of approximately 35 deg. with fully loaded belt to give maximum carrying capacity and eliminate spillage. The freely

suspended flexibly linked idler takes the form of the loaded belt yet remains resilient to avoid possible damage from blocky material.

The suspended idler structure is made for 20 in., 24 in., 26 in., 30 in., 36 in. and 42 in. wide belt. In practice, assembly of the structure is simple and quick. Stools with bottom rollers in place are spaced out, tubular stringers dropped into the stools and secured by their knock-in pins and the troughed idlers clipped over the tubular stringers.

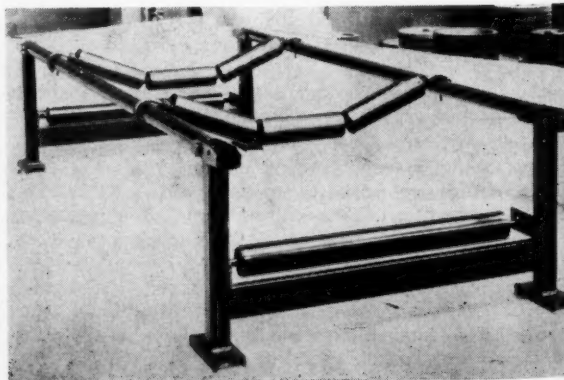
## ELECTRIC DRIVES FOR EXCAVATORS

Opencast coal mining sites, quarries and like operations, have provided a demand in recent years for large-capacity excavating equipment, and it has long been realized that electric drives, using direct current motors on the Ward-Leonard principle, provide an excellent method of driving the various motions of an excavator, particularly on the larger sizes of machine. The characteristics of motor drives with reference to equipment manufactured by The English Electric Co. Ltd. have been discussed at length by P. W. R. Gatliff in *The English Electric Journal*, Vol. 16, No. 3.

Generators, motors and control equipment by these manufacturers are used in a series of excavators manufactured by Ruston Bucyrus Ltd. (Lincoln), of the 150-RB type, mounted on caterpillar tracks and weighing about 200 tons. The specific moving unit has a bucket capacity of 6 cu. yd. and is designed so that it can operate either as a shovel or as a dragline.

In a typical digging cycle for a shovel excavator, the machine is propelled up to the working face until the bucket is within easy reach. The brakes are applied to hold the machine firmly on the ground. The bucket is brought against the face (crowd out) and moved upwards (hoist) until it is full. The upper works are then turned (swing) to bring the bucket over the tipping area or the lorry which will carry the material away.

Below, at left, is an N.C.B. picture of the Meco structure working underground at an East Midlands colliery. At right, a view showing construction



### The largest A.C. mine winder in Australia

A similar cycle is carried out for a dragline excavator. Draglines generally dig below the level of the tracks, while shovels work at the same level or above. The dragline bucket is suspended from the end of the boom, and by a combination of lowering and paying out of the drag rope the bucket is rested on the ground. The bucket is filled by pulling on the drag rope. The revolving superstructure is then swung until the bucket is over the tip or lorry, and the material is released by paying out the drag rope, which causes the bucket to tilt and empty.

The electrical control works on the principle of the 3-field-exciter Ward-Leonard scheme, and quick response is achieved by the use of rapid-response exciters. The motor ratings (nominal) are:—

For a shovel excavator—Hoist: 187½ h.p. 230 volts; Crowd: 44 h.p. 230 volts; Swing: 2×35 h.p. 115 volts (2 motors in series).

M.G. set drive motor: 300 h.p. 3.3 kV.

For a dragline excavator—Hoist: 187½ h.p. 230 volts; Drag: 187½ h.p. 230 volts; Swing: 2×35 h.p. 115 volts (2 motors in series).

M.G. set drive motor 300 h.p. 3.3 kV.

As propelling is not required during the digging cycle, it is arranged that the hoist motor can be declutched from the hoist drum and clutched to the propelling gear when it is desired to move the excavator. Steering is effected by declutching one crawler track and driving the other. The speed of travel is, of course, very slow, about 1 m.p.h. being sufficient.

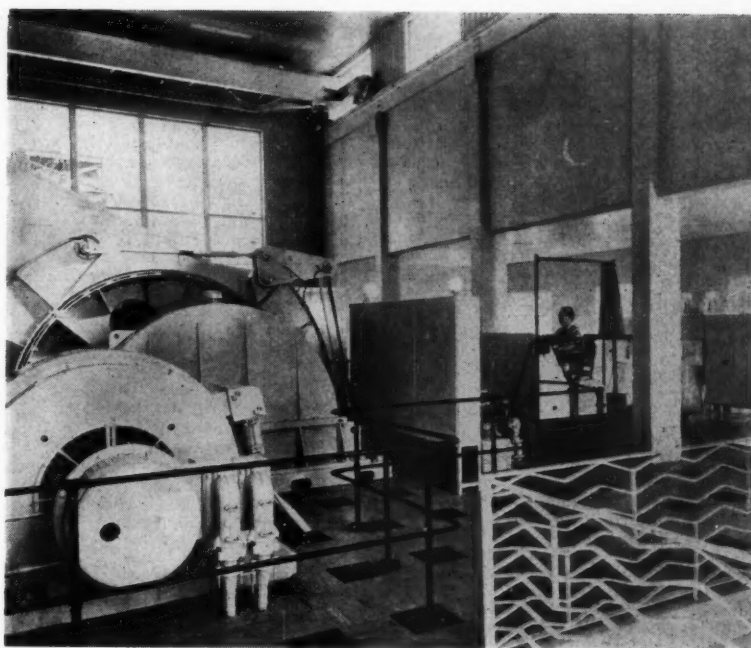
Power for the excavator is provided from the electricity supply through a trailing cable, usually at 3.3 kV. The power is transferred through sliprings and heavy collector shoes to the revolving structure.

### AUSTRALIA'S LARGEST A.C. MINE WINDER

Australian Electrical Industries Pty. Ltd., have recently installed at a mine near Newcastle, New South Wales, the largest A.C. winder so far commissioned in Australia, and the first to be fitted with power-operated brakes.

The winder, driven by a 1,100-h.p., 570-r.p.m., 6,600-volt, 50-cycle slipring induction motor, is designed to raise 300 tons of coal an hour from a depth of 720 ft. Speed variation and direction of winding are governed by a liquid controller and an air-break reversing contactor. A single-reduction gearbox connects the motor to the winding drums, the maximum speed of which is 68 r.p.m. In addition to the mechanical brakes, the driver has an electrical braking system which incorporates regenerative braking, reverse current breaking, and dynamic braking.

The main electrical equipment for the winder was manufactured by the A.E.I. Heavy Plant Division, the auxiliary equipment by Australian Electrical Industries at their Sydney Works, and the mechanical equipment by Marfleet and Weight, Melbourne, to the design of Markham and Co. Ltd., Chesterfield.



### The General Electric Co. Ltd. in 1959

During 1959 The General Electric Co. Ltd. maintained its service to industry, its efforts in the field of mining all over the world being of particular interest.

The period under review was one of intense activity in the production of winding engines, with 16 electric winders commissioned during 1959, four of them overseas and 12 in the U.K. for the National Coal Board. Among those put into service overseas was a 4-rope friction winder at the Stilfontein Mine of the General Mining and Finance Corporation of South Africa, which hoists a load of 15 tons from a depth of 4,800 ft. This is believed to be the greatest depth to which any friction winder is operating. Included in the numerous orders received from the N.C.B. were two that used grid-controlled mercury-arc rectifier-inverters to provide the speed control system.

During the year, one of the largest single-unit coal preparation plants in this country was commissioned at the Hawthorn Combined Mine of the National Coal Board. It deals with an input of 750 ton/hour with the larger fraction cleaned by the well-known Chance sand flotation system and the fines by froth flotation.

In the semi-conductor rectifier field, G.E.C. is now manufacturing silicon semi-conductor power rectifiers. Orders for silicon rectifiers in hand include one with an output of 2 MW. for installation at the Mond Laboratory, Cambridge. Plant and control gear for a 16 in. resistance-weld tube mill for Stewarts and Lloyds Ltd. is under construction. This mill is to be erected at Shotton, and will be the largest tube mill in the country.

In the sphere of power distribution a dominant feature has been the continued demand for airbreak switchgear for 3.3 kV. service. Orders for switchboards of this type rated at 250 MVA. breaking capacity are in hand for Tallawarra and

Wallerawang, Australia, and similar equipment rated at 150 MVA. is being built for Mount Isa Mines. Plug-in distribution equipment in the form of motor control centres and power distribution centres for service at medium voltages continues to be in demand.

An entirely new range of medium voltage a.c. switch-fuses, known as the "Hidutac" range, has been introduced. The design represents a complete break-away from previous conceptions of small switchgear. Major advances include high current-breaking capacity, high fault-current protection, greatly reduced size and unlimited full-load switching. There is also a new range of hydraulically-operated oil circuit breakers for 33 kV. service which is now in production.

Development work has continued on very high-voltage transformers and during the year a large 3-phase experimental transformer was successfully tested at an impulse voltage of 1,750,000 volts, which corresponds to a service voltage of over 380 kV. In an effort to establish the design safety margins, the voltage was increased to a level far in excess of the normal flashover voltage of the bushings. This was achieved by enclosing the bushing in an envelope containing gas.

The application of plastic materials as insulants of electric cables for use in the transmission of both power and telecommunication continues to expand. Polythene is extensively used for communications cables, but for low voltage mains distribution cables, increasing use is being made of polyvinylchloride (P.V.C.). In general, as opposed to conventional types of paper-insulated cables, P.V.C. insulated and sheathed cables may be installed in the ground without the necessity of providing metallic sheaths. Heat losses in power cables govern their maximum loading for a given conductor cross-section. This prompted the development by Pirelli-General of a system of water cooling.

## MINING MISCELLANY

Metal ores imported to Europe via West German seaports amounted to some 6,000,000 tonnes during 1959. In 1960 it is expected that these shipments will amount to about 7,700,000 tonnes, rising to 9,100,000 tonnes by 1965, and an annual level of 10,500,000 tonnes by 1970. Attempts are now being made, particularly by the iron and steel industry of the Eastern Ruhr, for an expansion scheme costing about £40,000,000, to enable the busy Dortmund-Ems Canal further, so that it could take 2,000-ton vessels. As recently as April, 1959, it was made possible for 1,000-ton ships to use the canal, which, however, is now declared to be quite inadequate for the steadily growing traffic and needs of Ruhr.

Among the proposed research programmes to be undertaken by the Euratom-U.S. Research and Development Committee are six suggested by Federal German industrial and research interests. They include research into the alloying of zirconium, particularly with niobium and silicon, for use in atomic reactors; research into production methods for uranium carbides, mixed carbides, etc., and into corrosion and property problems. In the past six months the committee has assented to the expenditure of a total of U.S.\$3,500,000 on research programmes.

Austria's coal output for 1959 totalled 6,350,000 tonnes, compared with 6,600,000 in 1958. Despite this production cut, unsold coal reserves amounted to nearly 400,000 tonnes by the end of 1959.

Indonesia is to include a minerals survey programme in her budget for 1960. A search is planned for manganese in the Tasikmalaja regency of West Java and around Jogjakarta, Central Java. Surveyors will examine gold traces in the Rengat regency of East Sumatra, at Meulaboh, in North Sumatra, in North Benjulen, South Sumatra and at Sungai Hanj Kapuas, Central Borneo. Nickel is believed to be present at Tanjong Pakar, in Djambi, South Sumatra and iron deposits will be explored in South Borneo.

More than 80 leaders in the diamond trade of the Western World will gather in Johannesburg in April, 1960, for a trade conference lasting about 10 days. Among the countries represented will be Britain, the United States, Belgium, Holland, France, Italy, Israel and Germany. Although South Africa is the world's second largest producer of diamonds, this is the first time that she will be host to this conference.

The Transvaal and O.F.S. Chamber of Mines, representing uranium producers, has agreed to contribute £400,000 a year to the £4,000,000 which the Atomic Energy Board plans to spend over the next five years on atomic research. The £400,000 will be contributed by uranium producers in proportion to their sales. Dr. W. J. Busschau, president of the Chamber of Mines, handed over the Chamber's first contribution to the atomic research fund—a cheque for £300,000—to the South African Minister of Mines, Mr. J. de Klerk, at a ceremony in Pretoria recently.

The Egyptian section of the government of the United Arab Republic is to form a company for the exploitation and processing of phosphates contained in reserves situated between Esna and Edfu in the Upper Nile Valley. It is reported that the company expects to have an annual capacity of 400,000 tonnes of phosphate, and investment needed for the project is estimated at some U.S. \$1,400,000.

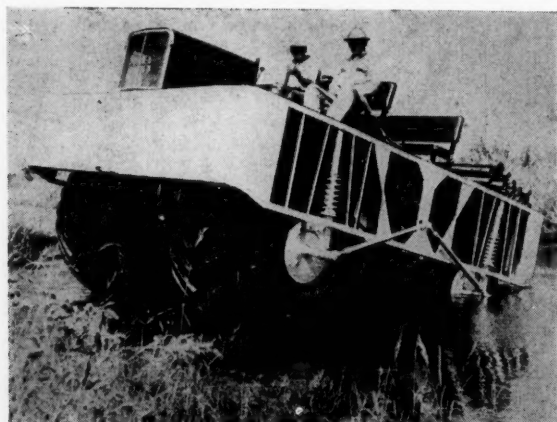
Large ore loading quays are being built in the Indian port of Madras. The construction is being undertaken by the Austrian firm of Simmering-Graz-Pauker A.G. für Maschinen-Kessel-und Waggonbau.

The first British coal combine of the Trepanner type in the Polish coal mining industry started work recently in the Brzeszcze colliery, Cracow voivodship. This combine is being used mainly for work on thick deposits of coal of high calorific value. It is planned to import further combines of this type for Polish collieries.

The North Korean Government has released details of its mineral mining industry. During 1958 a total of 6,880,000 tonnes of coal and 1,550,000 tonnes of iron ore were mined. These outputs according to the Pyongyang statement were higher than 1946 production totals by 400 per cent in the case of coal and by 600 per cent in the case of iron ore. Coal production for 1959 is believed to have been 9 per cent above the 1958 level. The increase in coal output is being achieved by a comprehensive pit mechanization programme, and already the larger coal mines are practically 100 per cent mechanized.

Traces of alumina reserves have been discovered on the Ordos grasslands in Inner Mongolia, North China. This discovery is the result of systematic prospecting by about 10,000 geological prospectors, working often in very hard conditions. They are also prospecting in the Khingan Mountains, for iron ore to supply the growing local metallurgical industry. In the course of this survey, two soda lakes have been discovered in the Ikh Chao League, and these are already being exploited as the basis for soda ash production on a scale which is likely to become very considerable, since the Ordos grasslands are believed to have 70 or more such lakes, representing a reserve estimated at over 20,000,000 tons. Two soda ash plants already completed were built in six and two months respectively.

Owing to cruzeiro depreciation, the official price at the mine-head for minerals in Brazil has been increased by the following amounts, less federal and state taxes: 20 per cent per tonne for aluminium, lead, copper, chromium, manganese, nickel and lithium; 10 per cent for columbite, cassiterite and molybdenum. Federal and state taxes combined average 8 per cent on the official price. Cia. Vale do Rio Doce has contracted to ship 4,500,000 tons of iron ore to Europe and U.S.A. in 1960. This company exported 2,212,156 tons in 1958, and 3,210,000 in 1959. These figures refer only to exports from the ex-British Itabira mines through the port of Vitoria.



This unusual vehicle is a new type marsh buggy, shown churning out of a swampy area on unique Terra-Tyres, manufactured by the Goodyear Tire and Rubber Co., U.S.A. The tyres which are over 5 ft. high, 42 in. wide and 18 in. at the hub, are being used on the new "Model 400" marsh buggy designed and built by Crain Brothers of Grand Chenier, Louisiana. Crain Brothers selected Terra-Tyres because of their low flotation, increased traction and greater mobility. Inflated to the proper pressure, the tyres can actually float the 4,000-lb. vehicle carrying a 4,000-lb. payload. The new marsh buggy will be used primarily for oil exploration and as personnel carrier in swampy areas

Soviet geologists are at present estimating valuable new coal deposits recently found at depths of from 300 to 500 ft. in the Altai Mountains, in Eastern Kazakhstan. The importance of these is in relation to their close proximity to a number of big industrial enterprises based on the rich local supplies of non-ferrous ores.

An occurrence of over 400,000 tons of calamine, averaging 17 per cent zinc, is being exploited at Januaria, Minas Gerais, Brazil, by Cia. Mercantil Industrial Inga. The ores are oxidized and silicated, calamine predominating, and are associated with vanadinite. The reserves of the latter are estimated at 100,000 tons, with 4 to 5 per cent vanadium, which will be mined as a by-product. So far vanadium has not been produced in Brazil.

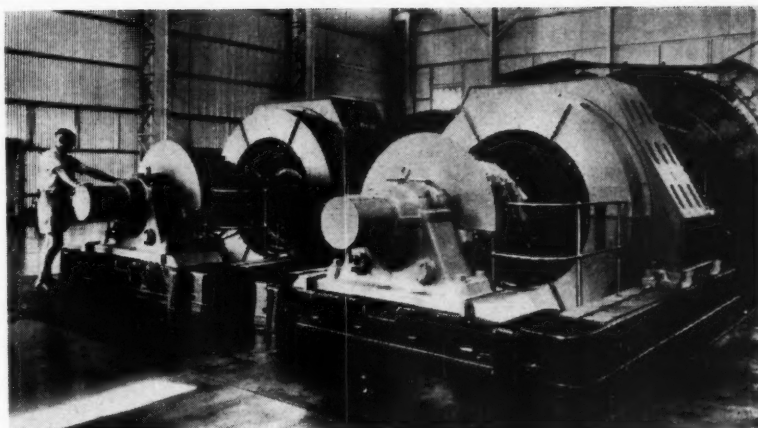
A new company has been established in Lima, Peru, by the Italian firm, Umberto Cipriani of Rome and Factoria Kruger of Peru for the manufacture of construction machinery and mining and railway equipment, using patents of the Italian firm.

In our issue of December 25 it was stated that the export of mined minerals from Turkey had been removed from all restrictions, as from December 3. This information was incorrect. We have now seen a copy of the official announcement, from which it appears that a considerable number of minerals and metals are still subject to export licence, including *inter-alia* copper, barytes, borax and boron compounds, pig iron, graphite, coal, molybdenite and wolfram.

The Noel Nickel Mine, Gwanda District, Southern Rhodesia, may be reopened in the near future, if the recent purchase by a Japanese smelting company of the mine's 120-ton stockpile of concentrates is followed up by a long-term supply contract. In preparation for a possible early re-opening, the mine's concentrator plant is being re-organized and improved, metallurgical tests on the mine's arsenide ore are being carried out, and an underground development programme to explore a recently discovered parallel ore shoot is being undertaken. The mine was put on a care-and-maintenance basis in June, 1958, after a drastic reduction in demand.

An Australian geologist, Dr. Frederick Booker, has gone to Damascus to undertake a year's survey of Syrian mineral resources for the United Arab Republic. Dr. Booker will work under the auspices of the U.N., and train Syrian geologists.

King Island Scheelite (1947) resumed mining operations on a limited scale on January 11. This is in accordance with a decision made last November. Directors said then that production would only be on a scale to meet deliveries under a twelve-month contract. The price basis should ensure a reduction in present cost of care-and-maintenance of the mine. The mine closed in August, 1958, because the price of tungsten had fallen to an unprofitable level.



A world shaft sinking record of 1,001 ft. in one month was recently set up at President Steyn G.M. in South Africa. The winder which achieved this feat was designed and manufactured by the Mining Division of The English Electric Co. Ltd. Rated at 4,040 h.p. and developing a peak output of 10,000 h.p., it raised the bucket containing 10 tons of rock at 2,700 f.p.m. Besides removing rock from the shaft, the winder was also used to lower all the material—drills, explosives, pumps—needed for sinking

## PERSONAL

Mr. Richard F. Summers, chairman of John Summers and Sons, has succeeded Mr. Lewis Chapman, chairman of Jessop-Saville, as president of the British Iron and Steel Federation. The Federation's council has appointed Mr. C. R. Wheeler, chairman of Guest Keen Iron and Steel, as president-elect for next year.

Lord Chandos, chairman of Associated Electrical Industries has left for a visit to India, where he will have meetings with the President, Dr. Rajendra Prasad, and the Prime Minister, Mr. Nehru, and will deliver addresses to the Indian Council of World Affairs, Delhi School of Economics and the Institute of Public Administration. He will also visit a number of factories and government establishments, including the factory site and townships of the government-owned company Heavy Electricals Ltd., for which A.E.I. are technical consultants.

Huntington, Heberlein and Co. (subsidiary of Simon-Carves) announce that Mr. A. T. Rogers, technical director and chief engineer, and Mr. R. F. Jennings, technical director, have been appointed directors of the company.

Mr. A. S. Bishop, is to retire from the chairmanship of the board of directors of Goodyear Tyre and Rubber Co. (Gt. Britain), on January 31. He will remain on the board as a director.

Mr. William H. Swayne has been appointed chief geologist, South American Division of the Anaconda Company.

Mr. B. Rosen has been appointed managing director of Sandvik Steels, Birmingham, as from February 1. He succeeds Mr. Olof Grundberg, who is leaving to take up another appointment.

The death is announced of Mr. Richard Merton in Frankfurt-on-Main, at the age of 78. Mr. Merton was for many years chairman of Metallgesellschaft, honorary president of the International Chamber of Commerce.

Mr. H. H. E. Georgel has been appointed contracting division manager of the Consolidated Pneumatic Tool Company in succession to Mr. H. H. Hicks, who has relinquished the position after 30 years' service with the company.

The Council of the Institution of Mining and Metallurgy announce that the following have been elected to office for the Session 1960-61: President: Professor David Williams; Hon. Treasurer, Mr. Robert Annan; Vice-Presidents, Mr. D. S. Burwood and Mr. W. Watson Connor, in place of Professor K. C. Dunham and Mr. R. B. Woakes, who will retire in accordance with the by-laws.

Dr. W. G. Hiscock, B.Sc., has been appointed chairman of the Lead Development Association for 1960.

Mr. T. B. Ellis has been appointed secretary of The General Electric Co., Ltd., from December 1, 1959. He succeeds Mr. T. B. O. Kerr, who was recently appointed director for Finance and Administration.

I.C.I. have announced the following Divisional Board changes: Mr. A. E. Hodgson has been appointed Development Director of the Heavy Organic Chemicals Division with effect from February 1; Mr. R. Haslam has been appointed Personnel Director of the Nobel Division with effect from February 1, in succession to Dr. A. C. Richardson, who is retiring; Mr. C. G. Harris, General Chemicals Division Research Director, retired on December 31, 1959.

## Metals and Minerals

# Consumption of Silver Rises

A substantial increase in demand for silver throughout the world is noted by Handy and Harman in their review of the past year, "The Silver Market in 1959". Consumption in non-Communist countries is estimated at about 296,000,000 oz., an increase of 18 per cent over 1958. Use in the arts and industries amounted to about 211,800,000 oz., an increase of 13 per cent; and use in coinage amounted to about 84,200,000 oz., an increase of 33 per cent. The largest volume gain in consumption in the arts and industries occurred in the U.S., which at 100,000,000 oz. was a gain of about 18 per cent over 1958. The highest relative improvements, however, were recorded by Japan with a 66 per cent gain, the U.K. (30 per cent) and Mexico (23 per cent). More silver was also used for coinage, due principally to new programmes in France and Italy.

The improvement in the production of consumer durable goods created a substantially better demand for silver in many different forms. There were also continuing increases in the use of silver for military purposes, particularly in aircraft, missiles and rockets. Apart from increases in the use of silver brazing alloys in these programmes, there have been significant developments in the use of silver products in military electronics, including power sources, guidance mechanisms and radar.

Total production of silver in the Non-Communist world amounted to about 195,000,000 oz., down 7 per cent from the previous year. Most of the decline was accounted for by the U.S., where production facilities were severely limited by the strike at major copper refineries which lasted from August to the middle of December. Silver production in Mexico was also lower, declining by 9 per cent to an estimated 43,200,000 oz. Canada with 32,900,000 oz. (up 6 per cent from the previous year) became the world's second largest producer, surpassed only by Mexico.

Progress was made during 1959 toward completion of the return of lend-lease silver, but 35,100,000 oz. remained outstanding, including 13,800,000 oz. still to be returned by Pakistan (in three equal annual instalments) and 21,300,000 oz. from Saudi Arabia.

Excluding the returns against lend-lease, silver imports into the U.S. during 1959 were 17 per cent below the comparable 1958 figure, being estimated at 61,200,000 oz. Total exports of silver from the U.S. at 8,800,000 oz. were about triple the 1958 amount.

Non-monetized U.S. Treasury silver stocks, generally known as free stocks, amounted to 175,100,000 oz. at December 31, 1959, being a drop of 13 per cent during the year. For the first time in almost two years manufacturers applied to the U.S. Mint for silver under the Act of July 31, 1946. It is anticipated that the resumption of normal production after the long strike will result in less need for Treasury silver by industry.

If forecasts prove accurate, business activity in general will continue at high levels, and under these conditions the present rate of silver consumption should be maintained. Assuming no change in the policies of the U.S. Government, Handy and Harman look for a continuation in the pattern of price stability of the past several years.

## NICKEL STOCKPILE SALES

The U.S. Government has announced plans to sell approximately 9,500 tons of cathode nickel at present in the Defence Production Act inventory and released by the Office of Civil Defence Mobilization. The General Services Administration has also been authorized to substitute approximately 8,000 tons of cathode nickel in the Defence Production Act inventory for sintered nickel from Nicaro production to pay balances due on previously negotiated settlements of premium price contracts.

## HIGHER TITANIUM SHIPMENTS

Titanium mill products shipments rose by 15 per cent in 1959 to a total of 3,100 tons as prices continued their downward trend, reported Mr. T. W. Lippert, director of marketing for the Titanium Metals Corporation in his year-end review. Mr. Lippert also referred to the broadening of titanium's market base and the growing momentum of alloy development. He pointed out that, since military aircraft construction would continue to dominate the U.S. titanium market for some time, it was difficult to forecast 1960 shipments because of the rapidity with which decisions on the manned aircraft programme fluctuated.

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According to the Bureau of Mines, U.S. Department of the Interior, U.S. production of titanium sponge during the third quarter of 1959 was at the lowest level in over a year and activity in all segments of the industry was down by 50-75 per cent from the previous quarter. Output of sponge metal fell from 1,449 tons to 724 tons of ingot from 2,171 tons to 842 tons. Consumption of sponge metal declined from 1,391 tons to 508 tons and of ingot from 2,129 tons to 591 tons.

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The slightly harder tone now evident in the U.K. rutile market, following a persistent decline from over £100 during the past three or four years, encourages the belief that at long last prices have touched bottom. Rather more buying interest is noted from Western Europe, while Australian producers are reported to be offering stiffer resistance to selling at the prevailing depressed levels. The present price range applies to shipment during the next few months; for second

half 1960 shipment higher prices are said to be asked, presumably in anticipation of improved market conditions. Nevertheless some little time must doubtless elapse before it can be stated with greater certainty that a reversal of the past trend is really under way. U.S. demand is still sluggish, since stocks in that country remain substantial.

## RECORD GOLD CARGO

Mocatta and Goldsmid are reported to have arranged for what is believed to be the biggest cargo of gold to be flown out of South Africa. Through bullion merchants of South Africa, they purchased over nine tons of gold from the South African Reserve Bank for more than £3,500,000 on behalf of a European buyer. It has now arrived at its destination.

## RISE IN MANGANESE SALES

At the close of last year the prevailing level of business on the U.K. manganese ore market still remained unimpressive, with prices not looking too secure, and there seemed little prospect of any worthwhile revival of demand in the immediate future. The generally subdued rate of demand may be an indication that many consuming countries are still in possession of useful stocks. This is certainly true of the U.K. where, it is understood, stocks remain on the heavy side. The U.K. is reported to have covered her anticipated requirements for next year.

In general, there appears to be a sufficiency of supplies and, until there is a resurgence of demand for marginal needs over and above those already contracted for and until stocks in many consuming countries are reduced, prospects for appreciation in prices of manganese ore do not appear too promising.

Demand from the U.S. has not been particularly bright, presumably because buyers in that country have been awaiting the outcome of the steel dispute. Now that a settlement has been reached they have no further reason for holding back. With new records for the U.S. steel industry confidently predicted for the current year, and with steel production running at a high level in other Free World countries, as well as behind the Iron and Bamboo curtains, it would be surprising if better times for the manganese industry were not in store.

Particularly encouraging at this difficult period was the recent statement by Mr. S. G. Menell at a meeting of Associated Manganese Mines in Johannesburg, that the tonnage of manganese ore sold for shipment in 1960 was already 50 per cent more than the tonnage in 1959.

This places total forward sales of manganese ore made by the company to date at more than 270,000 tons. During the first 11 months of 1959 the company shipped 180,000 tons of ore, which compares with total exports of 207,000 tons in 1958 and 227,600 tons in 1957. The company is South Africa's largest exporter of manganese ore, which is derived from its Postmasburg and Kuruman deposits. In 1950 it exported nearly 500,000 tons, but in the following years this total was reduced owing to difficulties (since overcome) experienced by the railways in moving ore to the coast.

The Russian *Industrial and Economic Gazette* reports that two new manganese ore mines with their own beneficiation plants are to be opened in the region of Chiatura in Transcaucasia.

#### PRICES UP FOR PLATINUM METALS

Indicative of the growing strength of the platinum market, is Johnson Matthey's decision to raise their platinum price from £28 10s. to £30 5s. per oz. as from January 21. Their New York quotation is also advanced by \$5 to \$82 for bulk quantities. This is the first change in the U.K. price since March of last year. As we go to press, Baker Platinum are still quoting £28 10s., but on past experience this position is unlikely to continue for long. Indeed, it is significant that earlier this week both refiners raised their prices simultaneously for palladium and rhodium (see price table).

The free market price for platinum is so far unchanged at around £27-£27 5s.

#### ALCOA'S NEW SMELTER

Alcoa has announced that start-up operations at its 150,000 t.p.a. capacity smelter at Warrick, Indiana, near Evansville, are scheduled for June, due to the improving demand for aluminium. Completion of the plant has been delayed for more than two years because of excess aluminium capacity during the business recession. The Warrick installation has been described as an \$80,000,000 industrial complex.

The Federal German Government has set the duty-free limit of crude aluminium into West Germany for the current year at 9,500 tonnes. This amount, which will be balanced by German exports of aluminium oxide, is 2,500 tonnes less than that set for last year. The limit for duty-free refined aluminium for 1960 is expected to be set at a level of 56,000 tonnes.

Three leading Japanese aluminium refiners have signed contracts with an Indonesian State-controlled mineral trading company to import 800,000 tonnes of bauxite from the Bintan Islands over the next two years. An official for the Japan Light Metal Refining Association stated that this was the first contract involving Association members for bauxite imports over a period longer than one year. The new contract covers nearly half of Japan's annual requirements of bauxite for aluminium production, which is running at about 800,000 tonnes annually.

The first shipment of bauxite to be exported from the Dominican Republic was reported nine months ago. Further shipments of Dominican Republic ore to Alcoa's new Point Comfort alumina refining plant are proceeding as planned. The Point Comfort plant is also receiving shipments of Surinam bauxite, a different type of ore which it is also equipped to refine. The plant will have a planned capacity estimated conservatively at 750,000 tons.

#### ZIRCONIUM AND HAFNIUM

According to the Bureau of Mines, U.S. Department of the Interior, the U.S. zirconium industry continued to produce reactor-grade sponge during 1959 at a rate greater than in 1958, last year's output of sponge being estimated at 1,386 s.tons (1,265 tons). Hafnium production rose to an estimated 33 s.tons from 23 tons in the previous year.

The market for zirconium for use in atomic power remained quiet during the year, but military requirements increased, principally for use in the construction of nuclear-powered naval units. Hafnium sponge and crystal bar were produced from materials of the zirconium process.

#### WOLFRAM MOVES HIGHER

Wolfram ore shipment prices continue to move higher in the London market, quotations currently ranging from 155s. to 160 s. per 1-ton unit c.i.f. Europe. A useful tonnage believed to be of European origin has been sold at 160 s. For more distant origins, the lower half of the range is reportedly more applicable. Consumer demand at the moment is said to be rather quiet, buying being mainly from merchants in anticipation of a revival of consumer interest before long. Meanwhile, sellers do not appear too anxious to make offers. It is understood that the Board of Trade's January quota was recently sold.

### COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The week's pattern has been the same as last week, namely that the undertone of all four metals has remained firm with one day of hesitation, almost certainly due to consideration of the weakness on Wall Street and the London Stock Exchange. Actual price movements have been small except in the case of tin.

#### LITTLE PROGRESS IN U.S. COPPER DISPUTE

The situation in the copper market is still one of good consumer demand in Europe and the Far East, demand in the U.S. approximately equalling the supplies available, and the strike situation in the U.S. showing little alteration.

Consumer demand in the U.K. and Europe is still sufficient to maintain a premium of about £15 per ton for wire-bars for prompt delivery, whereas the cathode market is less lively with prices ranging around the settlement price. The Belgian selling price has been raised once during the period to the equivalent of approximately 32½ c. per lb. New York or Antwerp. The price structure in the United States remains unchanged, with the exception that the customs smelter intake price for No. 2 scrap has been raised by ½ c. per lb. to 26½ c. per lb.

The strike situation has only altered inasmuch as the Kennecott Corporation has come to an agreement with one of the four unions still on strike in its Utah division, and that Magma has agreed a new contract for its workings at Superior, Arizona. However, it was pointed out that the production from this mine and also from Magma's subsidiary, San Manuel Copper Co., is treated at Phelps Dodge refineries, which are still on strike. It is understood that Phelps Dodge are carrying on leisurely negotiations but that some progress is being made, whereas in the case of Anaconda very little seems to be happening.

The market in London has been less

active than of late and both the price and backwardation show little alteration although there seems a tendency for the latter to widen. Stocks in official warehouses showed a further fall of 275 tons at the beginning of the week and now total only 5,047 tons.

The figures issued by the U.S. Copper Institute for December give a production of refined copper in the U.S. of 46,303 tons compared with 37,299 tons in November, whilst domestic deliveries were up about 6,500 tons at 90,123 tons and stocks showed a fall of about 10,000 tons to 64,763 tons. Outside the U.S. production of refined copper amounted to 157,312 tons against 149,197 tons the previous month. Deliveries to fabricators showed a slight increase at 148,056 tons and stocks fell to 228,243 tons as compared with 236,407 tons a month earlier.

#### BUFFER STOCK BUYING IN SINGAPORE?

The tin market has been featured by the continued activity in the East and a steady rise in the price in London with a tendency for the backwardation to widen and stocks falling 113 tons to 8,608 tons. The main subject of conversation is whether the buffer stock manager is buying tin in Singapore to replace tin which it is supposed he has sold in London recently in order to keep the buffer stock figure up to the 10,000 ton mark and it will be interesting to see the shipment figures over the next two months.

The shipments during the first half of January show that interest from the United States has increased considerably as the figure shipped to that country totalled 1,145 tons as opposed to only 390 tons in the corresponding period of December.

On Thursday the Eastern price was equivalent to £798 per ton c.i.f. Europe.

(Continued overleaf)

## LEAD-ZINC INTEREST CENTERED ON GENEVA AND WASHINGTON

The lead and zinc markets have shown a little alteration although there has been a lessening of the backwardation in the former metal. The zinc market was helped by an announcement that the Indian Government had arranged to import 10,000 tons within the next two months and also by a continued demand for the higher grades of the metal throughout the world, and it is understood that the special high grade production in the U.S. is almost sold until April.

The meeting of the study group in Geneva next week may cause the market to mark time. It is, however, being pointed out that the meeting is only of the study group and that in any case the restrictions of last year were imposed voluntarily by the producers and that a firm stand has always been taken against direct governmental intervention and, this being the case that it is hoped that the producers themselves will make some announcement on their own behalf on the relaxation or otherwise of the restrictions.

In the U.S. the United States Tariff Commission has finished its hearings on the question of quotas and higher tariffs and has to report by the end of March and advise on the desirability of additional restrictions in the form of higher quotas or increased duties, or both — apparently any relaxation of restrictions is not contemplated.

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The British Bureau of non-ferrous metals statistics have issued the following figures for the U.K. for the month of November and the comparative October figures are given in brackets:

	tons	tons
Consumption of copper	60,855	(61,101)
Stocks of refined and blister copper at the end of November ...	60,936	(64,602)
Offtake of lead amounted to ...	32,579	(32,926)
Stocks showed a sharp reduction at ...	46,984	(56,697)
Usage of zinc amounted to ...	29,221	(30,686)
End of month stocks were ...	35,460	(35,994)
Refined tin consumption totalled ...	1,841	(1,915)
End of month stocks were ...	10,545	(10,383)

Closing prices are as follows:

	Jan. 14		Jan. 21	
	Buyers	Sellers	Buyers	Sellers
<b>COPPER</b>				
Cash .. ..	£255½	£256½	£260½	£261
Three months ..	£245	£245½	£246½	£247
Settlement ..		£256½		£261
Week's turnover	9,175 tons		13,225 tons	
<b>LEAD</b>				
Current ½ month	£74½	£75	£74½	£74½
Three months ..	£74½	£74½	£74½	£74½
Week's turnover	6,600 tons		10,650 tons	
<b>TIN</b>				
Cash .. ..	£790½	£791	£792½	£793
Three months ..	£787	£788	£790	£790½
Settlement ..		£791		£793
Week's turnover	1,600 tons		705 tons	
<b>ZINC</b>				
Current ½ month	£94½	£95	£93½	£94
Three months ..	£92	£92½	£92	£92½
Week's turnover	9,925 tons		6,500 tons	

London Metal and Ore prices appear on inside back cover.

## Mining Finance

# An Important Diamond Agreement

"The Diamond Corporation announces that an exclusive agreement has been signed in London whereby all the diamonds from Soviet Russian production that the Soviet authorities wish to export for marketing in the western world will be purchased by it and sold through the Central Organization of the De Beers group of companies." With this simple statement to which official sources had nothing whatsoever to add De Beers quietly disposed of one of the bogies that have from time to time cast a shadow over the diamond share market, namely that Russia might one of these days flood the world with cheap diamonds and so undermine the price structure which has been so carefully nurtured by the De Beers organization over the years.

There is no doubt that the new agreement is of major importance, although quite how major it is difficult to judge owing to the impossibility of gauging just how large the Russian surplus of diamonds is likely to become. Over the past five years the Soviet news agencies seem to have gone out of their way to publicise in the western world claims of vast discoveries in the frozen wastes of northern Russia, regions where it is improbable that the stones could be mined and produced except at great expense. There is no doubt that Russia herself requires a greatly expanded output of industrial material for the many applications that the diamond has in industry. It is thus probably mainly gems that she may wish to market for the purpose of obtaining foreign currencies.

The financial resources of the De Beers group are now so enormous that it is unlikely that Russian diamonds will become an embarrassment to them, although much must depend, of course, on whether the market for the stones is still buoyant when and if the Soviet becomes an exporter on any material scale. The marketing agreements between the Diamond Corporation and the other producers outside the De Beers group who sell their stones through the Central Selling Organization will, incidentally, run out at the end of this year. However, it is unlikely that major snags will arise in their renewal now that Williamson's is in the De Beers orbit, although it is possible that Ghana may have some other ideas about marketing its native production.

## DE BEERS' DIVIDEND HOPES

De Beers Deferred naturally went better on the news, but market response was dampened by the setback that was occurring in the Stock Exchange generally. Removal of the Russian bogey and De Beers' pending entrance into the market for synthetic industrial stones have made it difficult to see any real bear point on the horizon for De Beers other than another recession in America and a consequent falling away in diamond sales from their record levels achieved last year when the value of the stones sold through the Central Selling Organization reached the peak figure of £91,000,000.

There is considerable optimism about the final dividend on the Deferred due to be declared in March. After many years of unchanged payments the interim for 1959 was stepped up from 4s. to 5s. a share. Forecasts of the final range up to 8s. 6d. against 6s. for 1958 and out in Johannesburg there are perennial hopes that there will be a huge share bonus one of these days. Certainly the company's capital is minute compared with the group's enormous assets. De Beers stand at 192s. 6d. to yield 5.2 per cent on the 1958 payment and as much as 7 per cent on the 13s. 6d. that is being hoped for in some quarters for last year. Both these yields would be increased quite materially for substantial tax payers owing to the savings represented by double tax relief.

## HENDERSON'S BID FOR WITBANK

Further details have now been issued of the offer by Henderson's Transvaal Estates for the capital of Witbank Consolidated Coal Mines, which should not, incidentally, be confused with the better-known Witbank Colliery company. A surprise in the announcement is that the Witbank directors do not recommend Henderson's offer, but they do not say why. The offer consists of three Henderson's 4s. shares for every four Witbank 10s. shares plus 5s. in cash for each Witbank share. The offer remains open until February 12 or fourteen days after that if Henderson's wish. It is conditional on 90 per cent acceptance.

It is doubtful whether there are many U.K. shareholders in Witbank so the affair on this side is best looked at from the Henderson's viewpoint. The object of the exercise is to exploit that company's Ogies coal property in South Africa. This, it is stated, is known to be underlain by considerable tonnages of coal which in recent years have become of economic value particularly if worked jointly with an existing producing colliery. Witbank's colliery of some 2,200 morgen is situated between the Tweefontein-Waterpan colliery, operated by Henderson's subsidiary Tweefontein United, and the Ogies mine. The latter could thus be exploited in conjunction with the already producing Witbank property. Witbank paid 1s. 7½d. a share for the year to last June.

For Henderson's the deal if it comes off thus looks to be an advantageous one. After paying a dividend of 15 per cent for many years in succession the company has blossomed out considerably in recent times. For the year to March 31, 1959, the payment was increased to 21½ per cent. Then the 1959-60 interim was raised from 6½ per cent to 8½ per cent and in order to give shareholders some benefit from the group's subscription rights at par in the new Leslie and Bracken gold mines in the Kinross field a share bonus of one for seven was made last November. This did not rank for the interim, but will qualify for the final due in April.

It has been officially forecast that the 2½ per cent total should be maintained on the capital as increased by both the bonus and the Witbank offer. On this basis the yield on Henderson's at 15s. would be 5.7 per cent. This is not very generous, but the shares still have some speculative possibilities owing to the company's varied interests.

#### JANTAR PAYS MORE

A loosening of the tin restriction screw and a reviving demand for columbite are probably the reasons behind the sharp increase from £27,547 to £42,681 in the gross profit of Jantar, the Nigerian producer, for the year to September 30 last. Higher tax liability eats into the net figure, but this at £21,681 is still just over £6,000 higher than in the previous year and the dividend is raised by ½d. to 4½d. per 2s. 6d. stock unit currently quoted at 4s. 9d. cum dividend to yield 8.3 per cent.

Present indications are that the company should do better still in the current financial year. There have been further increases in the production allowed under the International Tin Agreement and it is believed now to be possible to sell columbite fairly easily at the satisfactory price of around £800 a ton. It will be interesting to see what the chairman, Mr. C. A. P. Tarbutt, has to say about this in his annual statement.

#### BURMA CORPORATION SETBACK

Burma Corporation (1951) owned jointly by the Burma Government and Burma Mines, had a setback in earnings in the September quarter of last year. The net profit for the period comes out at £51,218 after estimated tax and depreciation. In the June quarter the comparable profit was £92,063. The decline is officially attributed to decreased production of all products, especially of refined pig lead and silver with consequent lower sales of all products.

Moreover, a further statement says that owing to circumstances beyond the company's control there was a serious decline in mine output in November and December which will result in a reduction in the quantities of refined lead, silver and zinc concentrates to be produced in the current quarter to March 31. The circumstances beyond the company's control might conceivably be taken to allude to a resuscitation of rebel activities in the neighbourhood of the property, but it is understood that this is not so. Exceptionally heavy mine repairs have had to be undertaken and, with the shortage of labour that is practically always being felt by the company these days, output has suffered owing to the necessity of switching workers over from productive operations.

Burma Mines 3s. 6d. shares fell to 1s. 10½d. following the news. The company paid a dividend of 1d. per share tax free for the year to June, 1958, but nothing has so far been distributed for 1958-59, although Burma Corporation is paying 3½ per cent free of Burma tax for that period, against 2½ per cent for 1957-58. Presumably Burma Mines will in due course also declare a possibly higher dividend for 1958-59. The 1959-60 prospects, however, must now become considerably more doubtful and the next quarterly due early in March will be awaited with a good deal of anxiety.

## LONDON MARKET HIGHLIGHTS

There were precious few highlights in the South African gold share market for most of last week. The long awaited corrective setback in the industrial share sections dampened any enthusiasm for mining issues. But actual selling remained light despite the long list of minus signs against prices and Johannesburg was always willing to take any stock offered by London.

One of the few stocks to resist the pervading dullness was St. Helena which moved up to 80s. 6d. at one time. This followed a steady support from the Cape in which Union Corporation is thought to have shown a lead.

Otherwise, all the popular stocks drifted a shilling or two lower. Free State Geduld, however, steadied after dropping to 185s.; the better tendency was attributed to U.S. support in London.

Surprise news that the Diamond Corporation had reached an agreement whereby Soviet diamond exports to the West will be sold via the Central Selling Organisation along with the major part of other world production stimulated De Beers for a while. They touched 194s. 4½d. before easing back later to 191s. 10½d. and in a more normal market atmosphere would probably have made a much greater response to the news.

Platinum shares began to improve when news was received of the Johnson Matthey decision to increase their platinum price from £28 10s. to £30 5s. an ounce. This move surprised many who, with past expansion policies in mind, had expected to see the improving demand for platinum reflected at first by utilisation of the currently idle production capacity at Rustenburg.

Apart from the effects of the weakness elsewhere, copper shares had also to contend with the dullness of Wall Street. Occasional bouts of Continental selling lowered Nchanga several shillings to 70s. 9d. at one time and Chartered came back 2s. 9d. to 112s. 3d. Attention was drawn to the investment merits of Roan Antelope, however, with the result that any of these shares offered were soon taken by fresh buyers.

Tins tended to lose a few pence here and there. But Jantar improved to 4s. 9d. following the higher dividend.

Australian issues reflected the firmness of the Melbourne market. Among the golds, Lake View hardened to 28s. and Great Boulder to 12s. 3d. Lead-zincs were also better, North Broken Hill rising 5s. to 117s. 6d. while Mount Isa, ready as always to respond to a firm tendency, moved up 9d. to 57s.

Elsewhere, Burma Mines lost 3d. to 1s. 10½d. following the disconcerting news contained in the September quarterly report. Rio Tinto, having previously been firm on their big copper share holdings, turned easier at 46s. in sympathy with the lower tendency in that share market.

As we go to press a surprise increase in the Bank Rate to 5 per cent was having little effect on markets beyond a precautionary widening of quotations.

#### BOARD CHANGES

Mr. W. S. Findlay has been appointed alternate to Mr. K. Richardson, a director of Rand Leases (Vogelstruisfontein) Gold Mining Co.

Brig. M. A. W. Rowlandson has been appointed a director and chairman and Mr. R. W. Rowland a director of the Cam and Motor Gold Mining Co. (1919).

Mr. H. A. B. Claypole has been appointed a director of Eileen Alannah Mining Co.

Lord Plowden has taken up his appointment as chairman of British Aluminium Co.; Sir Ivan Stedeford, who held that position has resigned from the Board, but becomes alternate director to Lord Plowden.

**Tanganyika Diamond and Gold.**—Speaking at the annual meeting of Tanganyika Diamond and Gold Development Co., Mr. E. J. Donaldson, the chairman, said that the new plant of Alamas Ltd. should come into operation early in the new year. When production begins, there will be an immediate increase in the quantity of gravel treated for 1,000 to 1,500 loads per day and eventually throughput should reach 2,000 loads per day. Production from June 30—the close of the financial year—to October 31 totalled 7,318 carats.

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## WESTMINSTER BANK LIMITED

### A PERIOD OF STEADY EXPANSION

The Annual General Meeting of Westminster Bank Limited will be held on February 10 in London.

The following are extracts from the circulated Statement by the Chairman, **The Rt. Hon. Lord Aldenham**, for the year ended December 31, 1959.

Our profit after tax for the year was £2,506,101, some £436,000 higher than in 1958. We have, however, to bear in mind that expansion and greatly increased activity in general do not necessarily go hand in hand with comparably higher profits, owing to greater operating costs of which Staff expenses are by far the most important.

During 1959 our Current, Deposit and Other Accounts have increased by £62 million to a new peak figure of £979 million.

#### Benefits of Freedom

Looking at the Assets side of our balance sheet, the most important feature is the rise of £97 million in our Advances, again to a new peak.

The form of lending known as Personal Instalment Loans has proved to be very attractive and a welcome source of new business and we are well satisfied with the results of our entry into this field.

Against the background of rising Advances, liquidity considerations have been in the forefront throughout the year and the maintenance of an adequate ratio has meant a running down of our gilt-edged Investments. You will see from the Accounts that this item has been reduced by £60 million.

Our Trade Investments now include the acquisition in 1958 of a 20% interest in Mercantile Credit Company Limited. This has proved a very worthwhile investment.

#### Branch Policy

The number of new banking offices opened in 1959 was 13 and our total representation now stands at 1,208 branches.

You will have seen in the Press from time to time announcements concerning fresh developments in banking services and in these matters Westminster Bank has been well to the fore. In January last we were the first bank in the country to open an office incorporating drive-in facilities; this was established on an eminently suitable site at Princes Road, Liverpool, and extensive use of it has been made during the course of the year. We recently introduced at our Bullion Office in London what is believed to be the largest coin-sorting and counting machine in the country and we are thus able better to satisfy our customers' wide-spread demands for silver sorted into all denominations. Perhaps the most interesting and most important development, however, was our application in November of a closed circuit television technique to the needs of our customers in the Manchester area.

#### Expansion with Stability

For the country as a whole the year has been one of steady expansion in

production, stimulated by concessions in the Budget and by the increasing use made of bank loans and other forms of credit. The expansion has been sound since it has been based on fuller use of industrial capacity, with a corresponding rise in productivity. Costs have also been helped by a continuance of moderate prices for our imports. These factors have in turn ensured a notable stability of retail prices. Personal savings, which have again been good, have also made their contribution to stable prices.

The balance-of-payments position remains good, and in consequence sterling has continued to be strong in spite of, or perhaps it may be more true to say, because of, the steps taken towards fuller convertibility. In fact, sterling withstood both the expansion in this country and the uncertainty of a General Election year. We have been able during the past year to repay ahead of time our indebtedness to the U.S. Export-Import Bank, amounting to £89 million. We have also repaid £71 million borrowed from the I.M.F. at the end of 1956. We have, moreover, during the year made a payment of £58 million to the I.M.F. as the gold portion of our increased quota. After these actions, and after making the annual payment of £66 million on the North American loans, our gold and dollar reserves are only £119 million less than a year ago.

#### Distribution of Gold

There has been a good deal of loose talk about the weakness of the United States' dollar, talk which has been brought about by the very considerable loss of gold by the United States. It seems unrealistic to think of a weak currency in a country which still has such a large favourable balance of trade. The redistribution of gold has, however, been at a rather rapid pace in recent months and it is fair that Americans should expect this country, and other countries of Europe, to carry rather a greater share of the provision of capital for underdeveloped countries than at present. We in this country have been doing a lot in this direction in the past few years, particularly in the Commonwealth countries to whom we have a special responsibility.

During the year there have been rapid developments in the arrangements between the six Common Market countries and the emergence of the European Free Trade Association of the seven. It would be infinitely better if one bloc could have been formed instead of two. At the moment the prospects of forming a bridge between the two blocs is not good; but there is undoubtedly a desire, shared in the United States, for some form of accommodation to be reached.

Economically the outlook is encouraging; so encouraging that during 1959 many ordinary shares rose to prices where the yield became much less than that on British Government securities: a most unusual position. It is worth remembering that when very many of us are reading our barometers as "Set Fair" it is time to watch your step.

## APEX (TRINIDAD) OILFIELDS

The 40th Annual General Meeting of Apex (Trinidad) Oilfields, Limited, was held on January 20 in London.

**Mr. F. R. Cottell**, chairman and joint managing director, presided and said that after provision for depreciation of fixed assets net oil revenue was £672,000. After providing £323,000 for taxation the net profit for the year was £470,000. The Directors recommended a final dividend of 1s. 6d. per 5s. unit of stock making a total dividend for the year of 2s. free of income tax per unit of stock.

Capital and reserves employed in the business totalled £6,466,000 and net current assets amounted to £4,681,000.

The year's production of crude oil and casinghead gasolene was 3,032,000 barrels and deliveries were 3,011,000 barrels.

The fall in oil prices continued during the Company's financial year and had been the major factor in the reduction in net oil revenue. Under the current sales arrangement with Texaco Trinidad Incorporated deliveries were restricted to 8,250 barrels per day including casinghead gasolene and this was the second important factor which had affected the results for the year.

In the event that the recession in oil prices and restriction of deliveries continued to affect oil revenue adversely the company was in the fortunate position, with its large revenue reserves and strong finances, of being able, if necessary, to supplement current earnings so that the drilling programme might be operated to the extent considered desirable and at the same time the payment of substantial dividends could be continued.

The Report was adopted.

## BURMA MINES LIMITED

reports that the operation of

### BURMA CORPORATION (1951) LIMITED

for the Quarter ended September 30, 1959, resulted in an estimated **Net Profit of K.6,82,900 (£51,218)** compared with **K.12,27,500 (£92,063)** in the previous Quarter. The reduced Profit resulted mainly from decreased production with consequent lower sales.

Details of Revenue, Expenditure, Ore Extraction and Production may be obtained from Central Registration Limited, 9 Basinghall Street, London, E.C.2, upon application.

Additionally the Board of Burma Corporation (1951) Limited states:

"It is regretted that, owing to circumstances beyond our control, there was a serious decline in Mine output for the months of November and December, 1959, which will result in a reduction in the quantities of Refined Lead, Silver and Zinc Concentrates to be produced in the Quarter ending March, 1960."

## Book Reviews

**Cobalt, No. 5, December, 1959.** Quarterly Publication on Cobalt and its uses, published by "Centre d'Information du Cobalt", Brussels, pp. 42.

This issue contains articles on the results of research currently investigating the influence of cobalt additions on the structure as well as the mechanical and chemical properties of ferritic and austenitic stainless steels. The influence of cobalt on the corrosion resistance of chromium steels is also studied, and the results discussed. This issue also contains a review of recently published technical literature on cobalt.

**Nuclear Metallurgy (Volume VI), Institute of Metals Division Series No. 9, published by the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers, pp. 94.**

The subject of the 1959 Nuclear Metallurgy Symposium was "The Effects of Irradiation on Fuel and Fuel Elements", and this volume contains the papers presented at this Symposium. At the present time most of the world's operating nuclear reactors are fuelled with various types of solid fuel elements. This symposium is divided into two sections: (1) The behaviour of metallic fuel materials; and (2) the behaviour of the ceramic fuel materials.

**Zinc: The Science and Technology of the Metal, its Alloys and Compounds, pp. 721, edited by C. H. Mathewson. Published by the Reinhold Publishing Corporation of New York, and by Chapman and Hall, in London, price 56s.**

This definitive monograph on the metallurgy, chemistry, extraction and uses of zinc is claimed to be the most complete book ever published on the subject. Forty-five specialists have collaborated in this work, which was written with the co-operation of the American Zinc Institute. The book's 14 chapters cover such topics as economics, geology, ore treatment, refining, processing, alloy technology, the use of zinc for extraction of other metals, zinc compounds, its biological significance and use in agriculture. The various sections of this work are published under the editorship of Dr. C. H. Mathewson, who has had a distinguished career in various fields of metallurgy, including the office of consulting metallurgist for the New Jersey Zinc Co., and Bell Telephone Laboratories.

**A Technical Survey of Dorman Long (Steel) Developments. Published by Iron and Coal Trades Review, November, 1959, pp. 210 (including advertisements and index.)**

This is the seventh in the Industrial Newspapers series of technical surveys. In a foreword, the chairman and managing director, Sir Ellis Hunter, writes that the completion of the £60,000,000 post-war development programme of Dorman Long has been considered an appropriate time to review the company's progress and survey the technical advances achieved in the last 15 years.

**Year Book and Guide to Southern Africa. (Price 10s. 6d., by post 12s. 6d.).** Contains over 750 pages of text, a 48-page atlas in colour by John Bartholomew and Son, a tour-planning map, town plans, and a large folding road planning map, etc. The book deals with the Union of South Africa, the Federation of Rhodesia and Nyasaland, South-West Africa, Basutoland, Bechuanaland and Swaziland, and Southern Angola. A new feature is the hotel and restaurant guide and a section specially for motorists, including much information on mountain passes. The book is published by Robert Hale, Ltd., for Union-Castle Line.

**Year Book and Guide to East Africa. (Price 8s. 6d. by post, 9s. 9d.).** 370 pages of text, 16-page atlas in colour by John Bartholomew and Son, a large folding road planning map and a folding map of Africa in colour. This book deals with Kenya, Uganda, Tanganyika, Zanzibar, Portuguese East Africa, Congo, Mauritius, Seychelles, etc. The book is published by Robert Hale, Ltd., for Union-Castle Line.

**Process Integration and Instrumentation, pp. 203. Price 8s. 6d.,** is the title of the latest addition to the Electrical Development Association's series of "Electricity and Productivity" books. The trend towards fuller automation and process control is apparent in mining and mineral processing, as in so many other modern industries, and this work with 141 illustrations, is in a readable style, without recourse to mathematical formulae or references to abstruse points of design. It should prove a very valuable help for the industrial manager and production executive, especially of the medium and smaller concerns, in assessing the variety of types of apparatus available today.

**Everyman's United Nations. 6th Edition, published by the United Nations Office of Public Information, New York, pp. 624, price \$3.50 or equivalent in other currencies.** This is the official reference book on the work of the United Nations, describing its structure and functions, and providing a cumulative account of the work of the Organization and its affiliated international agencies up to the beginning of 1959. The Sixth Edition is divided into three main parts: Description and purposes of the U.N.; work of the U.N.; Intergovernmental agencies related to the U.N.

**Future of Non-Ferrous Mining in Gt. Britain and Ireland, pp. 595 and index, published by the Institution of Mining and Metallurgy at £3.** This volume contains the proceedings of the Symposium arranged by the Institution of Mining and Metallurgy in collaboration with the United Kingdom Metal Mining Association, held in September, 1958. The papers contributed covered the economic geology of the principle areas of mineral occurrence; exploration techniques; working of existing non-ferrous metal mines; mineral rights; mining taxation and metal prices.

**Statistical Year Book 1959,** has been published by the International Tin Council, price £2 10s. pp. 284. This is the first Year Book on the tin-producing and tin-consuming industries of the world which the International Tin Council has published. It follows the four Year Books issued for the years 1949, 1952, 1954 and 1956 by the International Tin Study Group. The Year Book is not purely statistical. Its general articles on the operation of the International Tin Agreement and the development of the tin position give an essential background to the wider economic study of the tin industry.

Notes on the geography and on the importance of the tin and tinplate industries in each country are also included. The Year Book has been divided into two sections, the first dealing with tin and tin plate, giving fullest available details on production of tin at mine and smelter, for each country, imports and exports, consumption of tin and on the production and trade of the tinplate industry. The second part deals with all aspects of the canning industry. Most of the tables cover the ten-year period prior to 1957 or 1958.

A brochure entitled **The British Metal Corporation Ltd., and its Associates,** outlines the organization and activities of the Corporation, which was formed in November, 1918, its principal objects being to foster trade in non-ferrous metals in the U.K. and the Commonwealth, to extend the mineral and metal production of the Commonwealth, to maintain the position of the London Metal Exchange and to promote the well-being of the whole non-ferrous metals industry. In 1929 came the financial link-up with Henry Gardner and Co., through the formation of a holding company, Amalgamated Metal Corporation, Ltd., for the general purpose of advancing still more strongly the Commonwealth's interests in the field of non-ferrous metals. The association of The British Metal Corporation with C. Tennant Sons and Co., of New York, The British Metal Corporation (Canada) Ltd., and Vivian, Younger and Bond, Ltd. (whose activities were reviewed in our issue of December 11 last), dates from soon after the end of the First World War.

Since 1930, the Corporation has had substantial holdings in the Societe Generale des Minerais, S.A., Brussels, and in the Norddeutsche Affinerie, Hamburg. Since the last war, in order to extend its interests in the Commonwealth, the Corporation has formed companies in Australia, India, Pakistan, South Africa and Central Africa, and a branch office has been opened in Uganda.

**Canada 1959.** Prepared in the Canada Year Book Section, Information Services Division, Dominion Bureau of Statistics, Ottawa, pp. 317, price \$1. This illustrated Canada Handbook constitutes a factual, annual survey of the Canadian economy set in a statistical background and illuminated with illustrations of the recent economic, social and cultural development of the nation.

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From the position of a minor producer of manganese, Australia, in the past five years has become one of the world's biggest exporters of manganese ore. For a considerable time, exports of manganese ore were prohibited by the Commonwealth Government, because of the very limited reserves in the country and the need for their conservation for the iron and steel industry. Prospecting showed some improvement in the position and the prohibition was removed, with the result that stimulation to prospecting has shown a substantial increase in reserves to such an extent that an active mining and export industry has been established.

The industry has been, and is, in the hands of comparatively small operators, but the extent of results from prospecting has led to the taking up of options by Rio Tinto in the Pilbara mineral field, in the north-west of Western Australia. The deposits covered by the options are situated in the Ripon Hills, where a main camp has been set up.

**MOUNT LYELL PUSHES ON**

Mount Lyell Mining and Railway Co. is pushing on with its expansion programme, and new capital is being raised to finance operations. Directions for new expenditure are the new crushing station at the West Lyell open cut and its equipment; testing the Crown Lyell No. 2 orebody which contains higher grade ore than the main ore occurrence; payment for the company's interest in the Renison Associated Tin Mine; prospecting operations in the Moore Valley in the south-west corner of Tasmania, where work to date has been encouraging for the location of an orebody of importance; and finally, the West Lyell open cut itself.

Expansion here calls for expedited removal of overburden. It has been decided that this can be done more expeditiously and economically, with the avoidance of expenditure on plant, by private contract rather than by the company itself. A contract has, therefore, been let to Utah (Australia) for the removal of 2,000,000 tons of rock overburden, from the workings. The orebodies are now better defined by the increased depth attained, and the overburden removal planned will increase the production of copper. Drilling has indicated a substantial increase in tonnage, with better grade ore, below the projected bottom of the open cut, and the economics of underground mining are being investigated.

**EXPLORATION AT KALGOORLIE**

Kalgoorlie Southern Gold Mines has outlined a possible area in the course of drilling, over the past 10 years, in its work to prove, or disprove, a repetition to the south of the field, of the auriferous beds of the Golden Mile. In the course of the exploration, 43,000 ft. of holes have been drilled. Work is now to be carried to deeper horizons and a new diamond drill, claimed to be one of the largest in the world, has been constructed in Australia; the range of the drill is 10,000 ft., and a 2½ in. dia. core will be cut. The first hole with the new drill has been commenced and is planned to a depth of 4,000 ft. The 11 holes so far drilled, and associated expenses, have cost £A280,000.

*This feature appears every fourth week*

## MINING FINANCE—Continued

## TROUBLED TIMES FOR GREAT WESTERN CONSOLIDATED

This company, operating at Bullfinch, Western Australia, has incurred indebtedness of £A1,720,261 to September 8, 1959. The grade of ore in the extensive lodes has been too low to show an adequate margin of profit, and although there has been modest success in recent development at the Copperhead mine, adverse underground conditions and delays have caused the financial position to deteriorate further.

It is now necessary to confine development to the most essential tasks on the most favourable objectives and this work will be restricted to developing and opening up known and indicated ore shoots. Available ore is expected to maintain operations for at least three years.

Prospecting to date in the Yilgarn gold-field has not yet succeeded in finding repetitions of orebodies of the grade and size comparable with the original major producers in the district. Such chances still remain, and prospecting for new ore will not entirely cease. Since the formation of the company, severe inflation has increased operating costs and has caused the cost of equipping and bringing properties into production to be much greater than could have been anticipated.

**Motapa Liquidation.**—At an extraordinary meeting on December 14, Motapa Gold Mining was placed in liquidation. The transfer books will close finally on February 15, and the listing of the shares on stock exchanges will cease on February 11.

## COMING EVENTS

The 12th Liege International Fair will be held on June 21-6, 1960. During its run the Institute of Welding will hold its annual conference in Liege.

★

The second conference of the Euro-

pean Federation of Purchasing will be held in Scheveningen, Holland from April 21-23, 1960. One of the sessions will be held by Mr. J. Murray Grammer, Director-General of Purchasing and Stores, N.C.B.

**DAVIES INVESTMENTS LTD.**, Bankers, still offer  $7\frac{1}{2}$  per cent on sums £20 to £500 (withdrawal on demand) with extra  $\frac{1}{2}$  per cent on each £500 unit. Details and audited Balance Sheet from Investment Dept. MN, Davies Investments Ltd., Danes Inn House, Strand, London, W.C.2.

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Two British Overseas Mining Association scholarships value £500 per annum, tenable at the Royal School of Mines, are available for two-year conversion courses in Mining Engineering or Mineral Dressing leading to the award of the A.R.S.M. and B.Sc.(Eng.) degree. Candidates should have graduated or be graduating in some other branch of Engineering or Applied Science. Application forms to be returned by March 31, 1960.

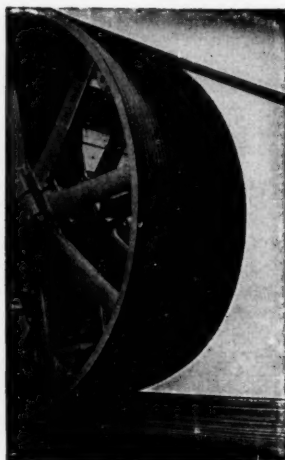
An advanced course of one academic year, leading to the award of the D.I.C., is available for post-graduates who, after practical experience, desire to broaden their knowledge of the administration and economics of metalliferous mines. Some scholarships are available for this course.

Further particulars and application forms from the Registrar, Imperial College, S.W.7.

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Arsenic, £400 per ton	Osmium, £21/£23 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 10s. 0d. lb.	Palladium, £9 7s. 6d.
Cerium (99%) net, £16 0s. lb. delivered U.K.	Platinum U.K. and Empire Refined £28 10s. oz.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Imported £27/£27½ and £30 5s.
Cobalt, 14s. lb.	Quicksilver, £71½/£72 ex-warehouse
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram	Rhodium, £50 oz.
Gold, 250s. 9½d.	Ruthenium, £18/£20 oz. nom.
Iridium, £23/£25 oz. nom.	Selenium, 50s. 0d. per lb.
Lanthanum (98%/99%) 15s. per gram	Silver, 79½d. f. oz. spot and 79½d. f'd
	Tellurium, 21s. 6d. lb.

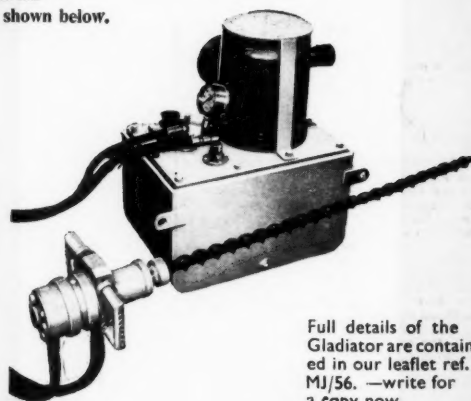
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Lepidolite min. 31% Li <sub>2</sub> O .. .. .	40s. 0d./45s. 0d. per unit f.o.b. Beira
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